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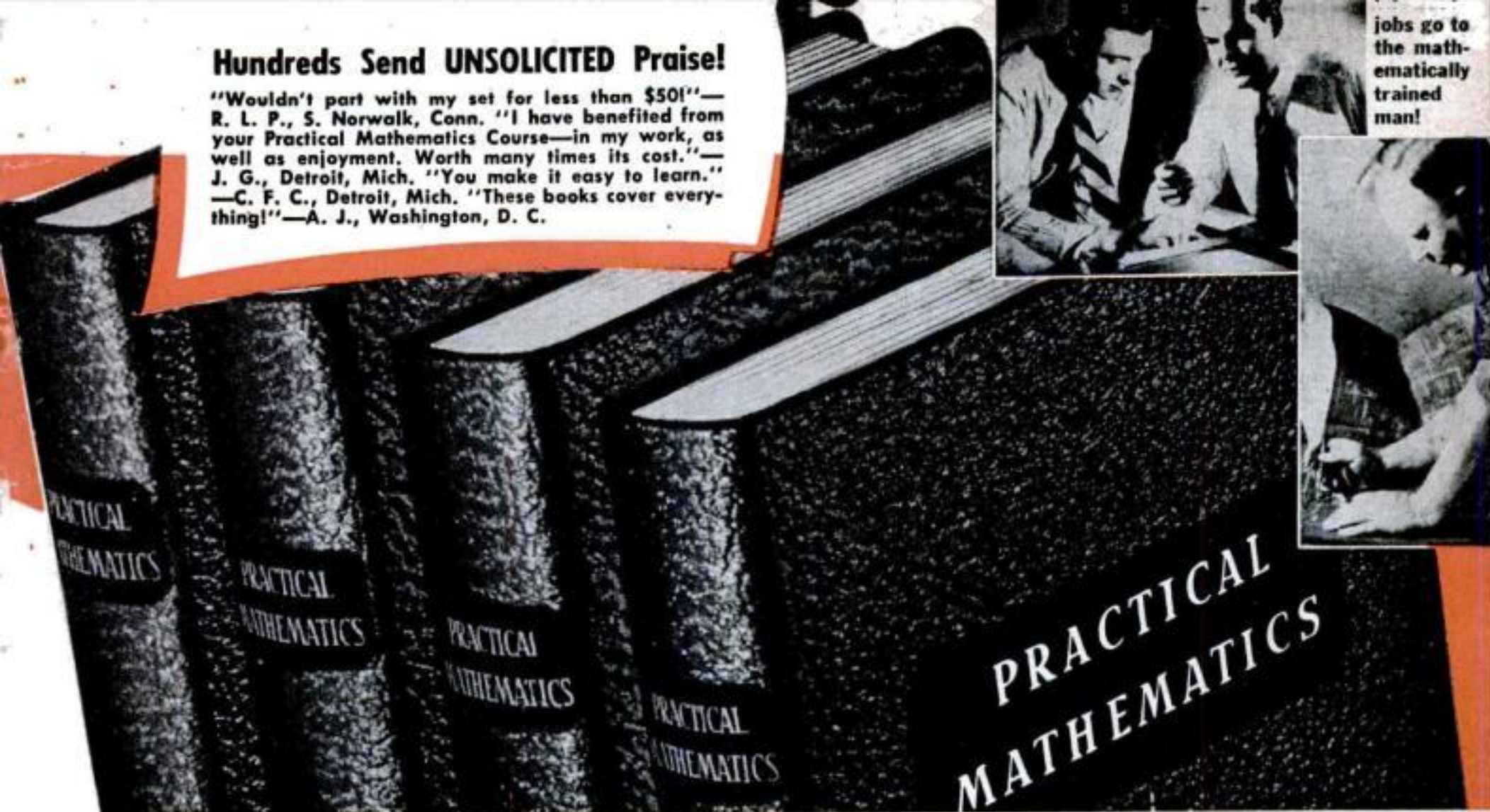
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Mechanics and Handicraft
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January, 1954

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Fifty-seven passengers in this airliner (left) and the one that hit it were lucky: all got out alive. But 175 other people have been killed in 34 of 86 other mid-air collisions in the last five years. For a report on possible causes and cures, see "Scientists Tackle Pilots' Deadly Blind Spots"—page 114.

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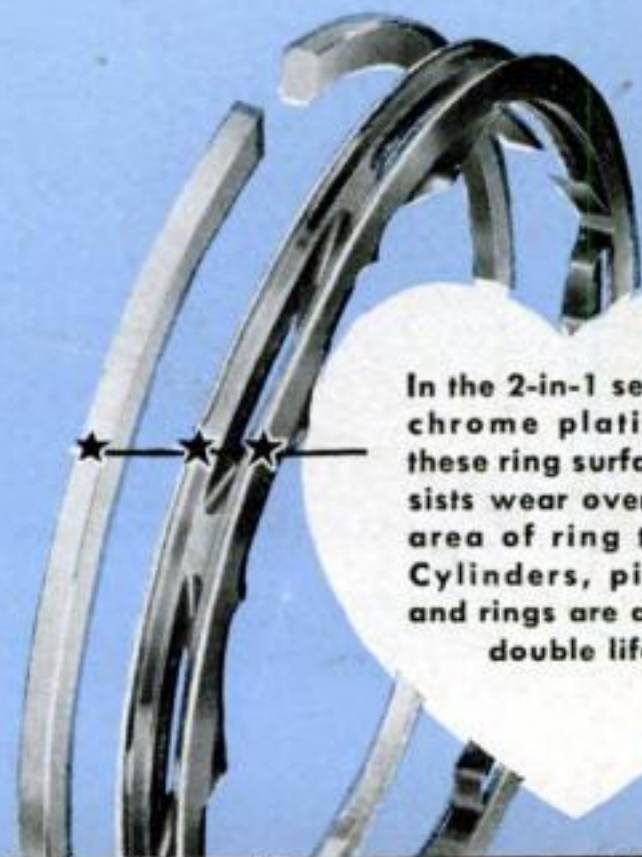
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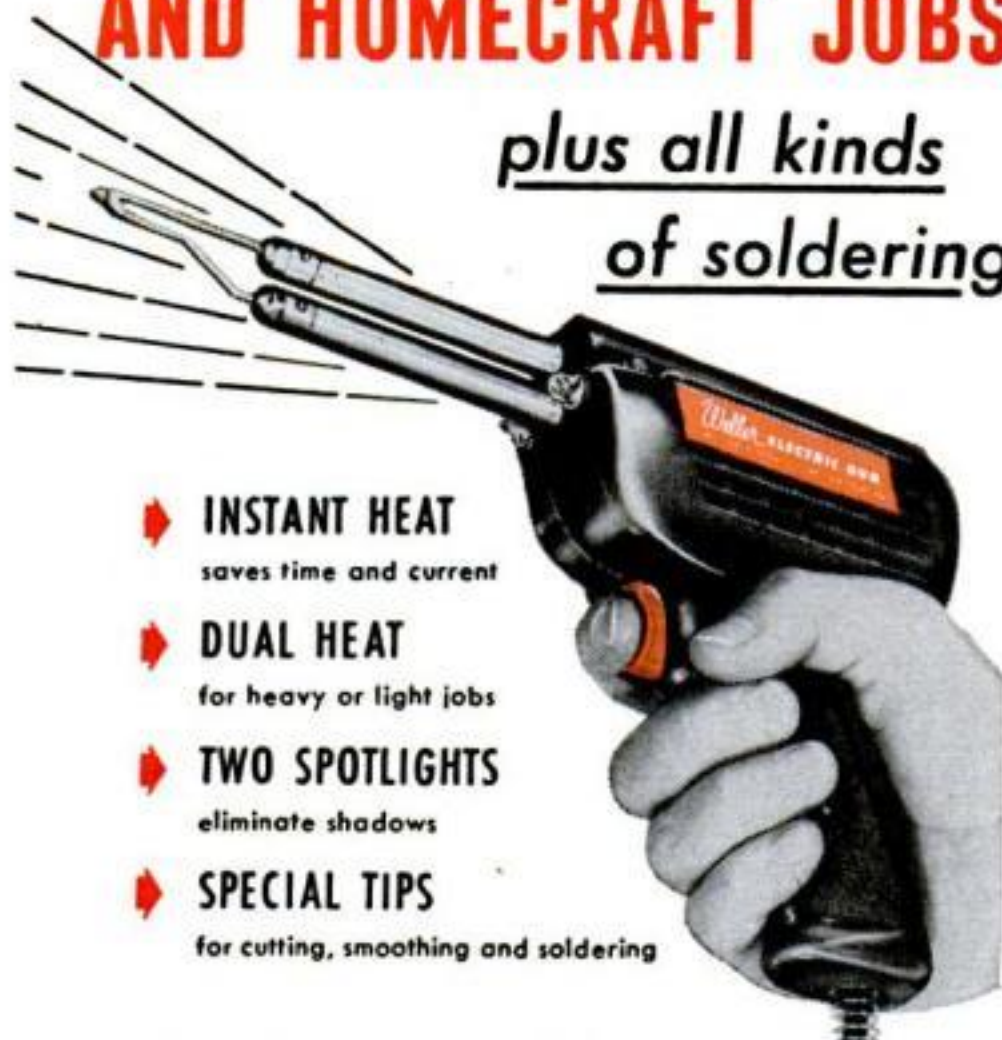
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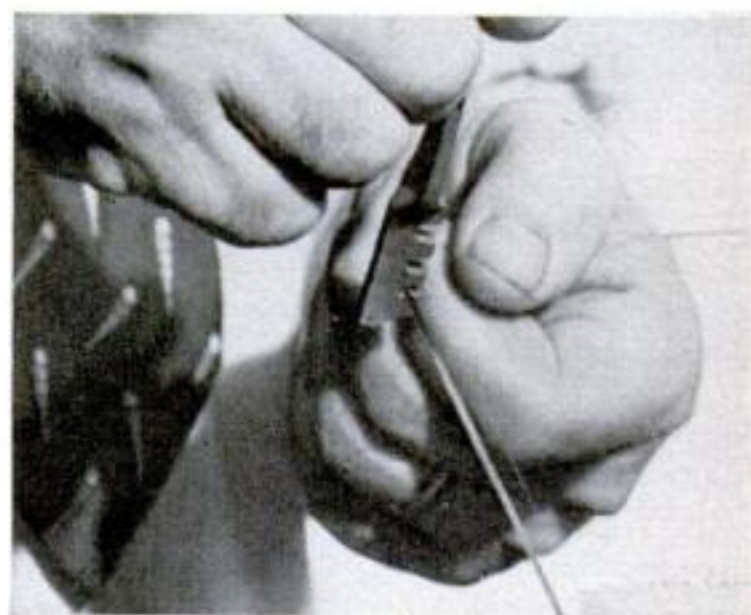
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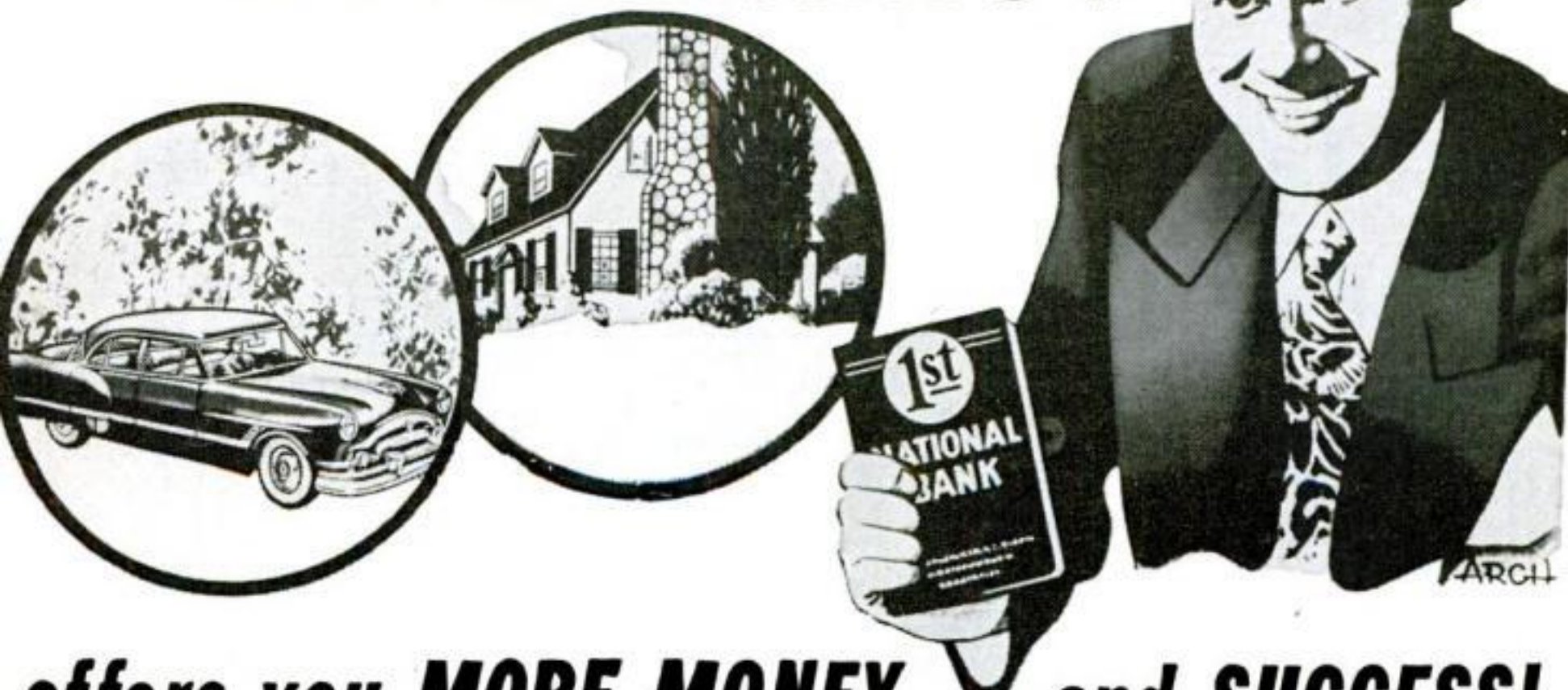
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JANUARY 1954 7

USED CAR BUYERS!

Here's New Proof That Nash—
The "Car with the Double Lifetime"
—Is the Best Used Car You Can Buy!

IT JUST makes good common sense that the more quality and durability built into a new car originally, the more good miles you'll get from it as a used car. And Nash is the car with the "DOUBLE LIFETIME" built in—built to last twice as long as the average automobile—as so many owners will testify.

Read these paragraphs from a letter by enthusiastic Nash owner, Clyde H. Andrist, of Fort Collins, Colorado:

"I have had extremely fine service from all my Nash cars . . . drove a 1941 Nash Ambassador 256,000 miles and had only one motor overhaul. Drove a 1948 Ambassador 89,000 miles and had no work done on it at all. Traded it in on a '49 Nash which still looked and performed like new at 134,000 miles when I again traded—for a new Nash.

"My cars are subject to hard usage . . . averaging 60 miles per hour on long drives . . . I still average better than 22 miles per gallon and never add oil between changes . . . on all kinds of roads . . . plowing through heavy mud or deep snow . . . in temperatures as low as 54° below zero and up to 118°." Think of it—134,000 miles on a '49 Nash Ambassador—and it still ran like new—and looked like new!

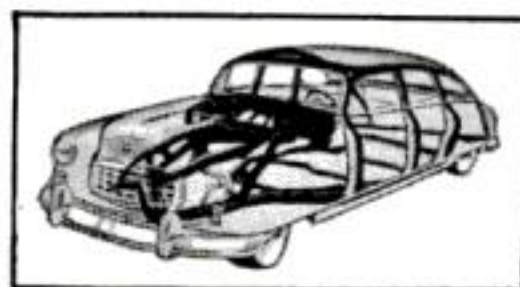
What this means to Used Car Buyers

When you buy a used Nash, you can look

forward to more wonderful miles than you ever dreamed a car would deliver.

Because that's the way every Nash is built—built to give a "DOUBLE LIFETIME" of care-free motoring.

Why do Nash cars last longer? Because of exclusive Nash Airflyte Construction!



Instead of the ordinary body bolted to a frame, the structure of every Nash is a solid, welded

unit. There are no body bolts to loosen, rattle or squeak. It is twice as rigid, stronger and safer—stays new years longer.

Why do Nash cars seldom need repainting? Unlike other car-makers that use quick-drying

lacquers, Nash employs specially formulated enamels baked to a hard, porcelain-like finish. This durable finish is



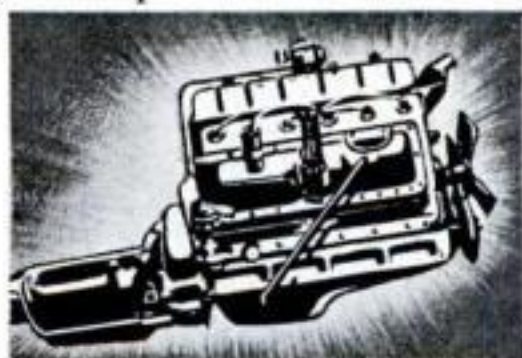
"anchored" to sheet metal completely treated with the famous Bonderite rust-proofing process to resist aging, cracking, rusting—to stay beautiful years longer.



This 1951 Nash is typical of many fine, low-priced used cars on Nash dealers' lots right now!

Why are Nash cars more economical to run? Every Nash has a sealed-in Iso-Thermal Intake Manifold, and high compression to deliver

more power on less gasoline, under all conditions. Every Nash engine has the vibration-free smoothness



of a counterbalanced crankshaft. And every Nash engine today has a special oil-control ring employing a new principle to give low oil consumption over thousands of miles.

The car with the "Double Lifetime"

Drive your Nash as long as you want—as far as you like . . . you probably will never use up the reservoir of service—the "DOUBLE LIFETIME" that was built into it originally. That means, of course, it will be worth more when you sell it—you'll be money ahead when you pass it along to the next owner.

How exclusive Nash features

Double your Travel Pleasure

Now let's forget the dollars and cents you *save*—and think about the pleasure you *gain* when you buy a used Nash.

You'll get extra room for passengers and luggage to make traveling so much more enjoyable.

Most Nash used cars have the famous Weather Eye Conditioned Air heating and ventilating system—and built-in beds for overnight sleeping!

So when you are looking for a good used car, remember these facts about Nash "DOUBLE LIFETIME" Value. You'll treat yourself to the finest buy you ever had in an automobile!



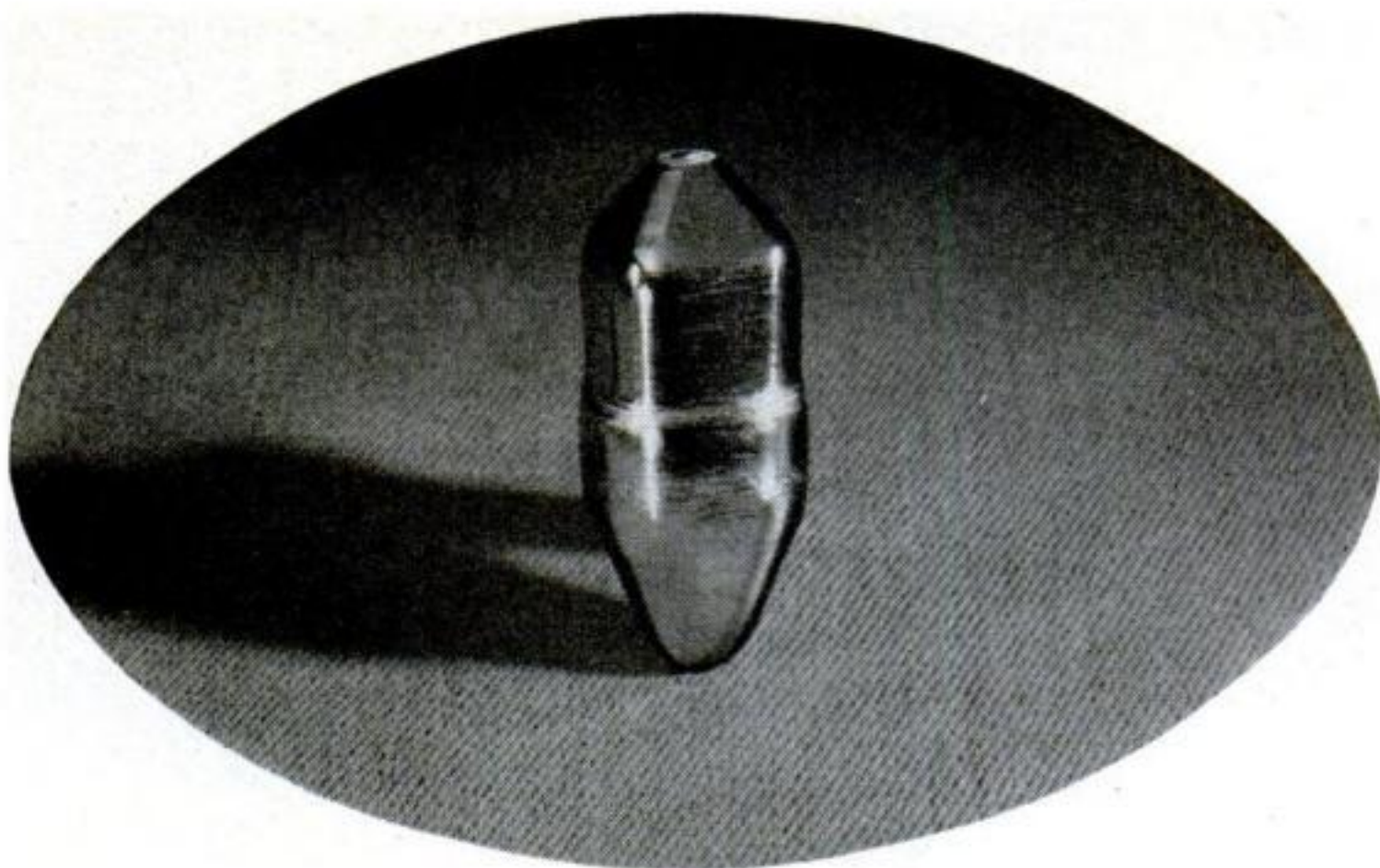
Nash

***The Car With The Double Lifetime
... Built to Stay New Longer***



**SEE A NASH DEALER FOR THE
BEST USED CAR "BUY" IN TOWN**

Nash Motors, Division Nash-Kelvinator Corporation, Detroit, Mich.



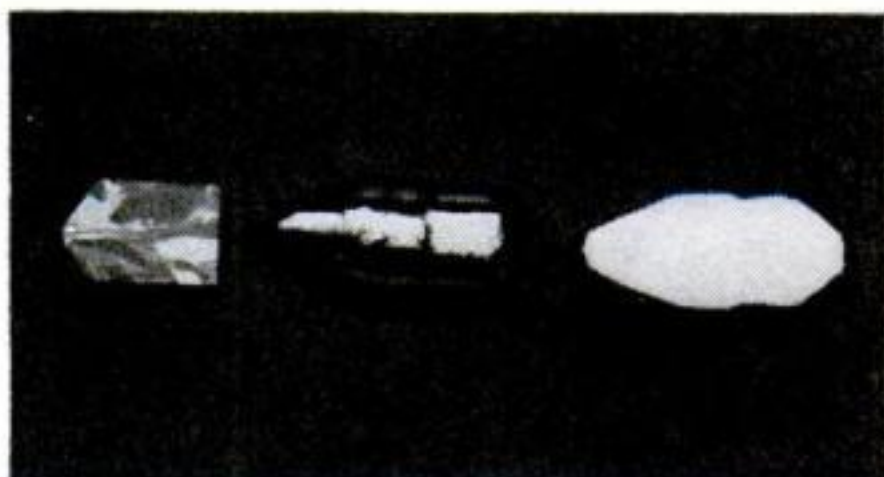
Germanium crystal grown at Bell Telephone Laboratories (half size). It is sliced into hundreds of minute pieces to make *Transistors*. Transistor action depends on the flow of positive current-carriers as well as electrons, which are negative. Arsenic—a few parts per 100,000,000—added to germanium produces prescribed excess of electrons. With gallium added, positive carriers predominate. Latest junction type *Transistor* uses both kinds of germanium in the form of a sandwich.

THEY GREW IT FOR TRANSISTORS

Heart of a *Transistor*—Bell Telephone Laboratories' new pea-size amplifier—is a tiny piece of germanium. If *Transistors* are to do their many jobs well, this germanium must be of virtually perfect crystalline structure and uniform chemical composition. But it doesn't come that way in nature.

So—Bell scientists devised a new way to *grow* the kind of crystals they need, from a melt made of the natural product. By adding tiny amounts of special alloying substances to the melt, they produce germanium that is precisely tailored for specific uses in the telephone system.

This original technique is another example of the way Bell Laboratories makes basic discoveries—in this case the *Transistor* itself—and then follows up with practical ways to make them work for better telephone service.



Section of natural germanium, left, shows varying crystal structure. At right is sectioned single crystal grown at Bell Laboratories.

BELL TELEPHONE LABORATORIES



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THIS ISLAND EARTH, by Raymond F. Jones—You're an engineer working on a secret project. When your girl becomes suspicious of your employers, they kidnap her. Then your plane is swallowed up in mid-air by a GIANT flying saucer!

THE SECOND FOUNDATION, by Isaac Asimov—The terrible genius called the "Mule" had conquered almost the entire Galaxy. Only one civilization had escaped his evil clutches. How could they stop this mad man?

RING AROUND THE SUN, by Clifford D. Simak—They begged Bob Vickers to help destroy the "mutants"—a strange new race of humans with mysterious powers. But then Bob found that he was a mutant!

SANDS OF MARS, by Arthur C. Clarke—You are the first Earth-man to rocket-crash onto the wild desert sands of Mars . . . the first to find yourself face-to-face with . . . A MARTIAN!

THE MIXED MEN, by A. E. Van Vogt—ONE of the million planets is inhabited. Your job is to find out which one and contact these "humans." But they're ready with every trick in inter-stellar science to stop you!

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JANUARY 1954 II

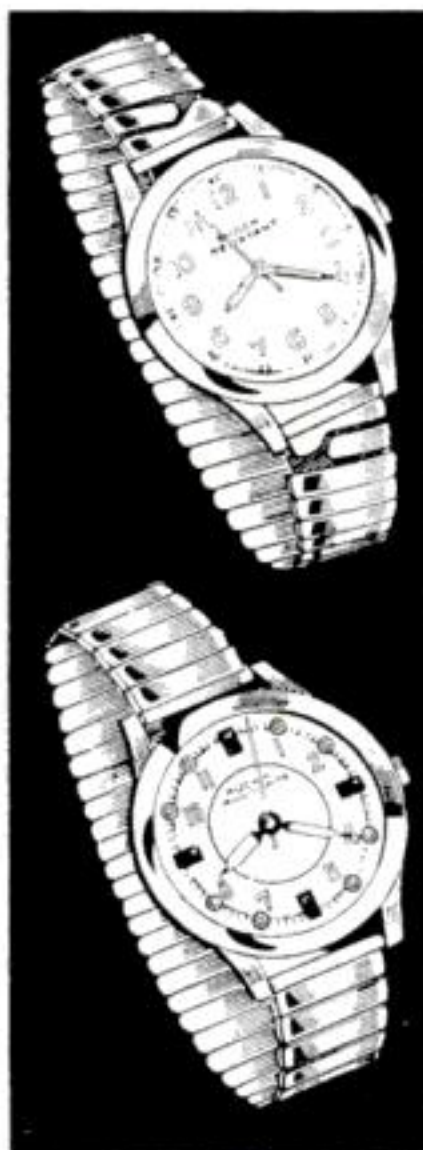
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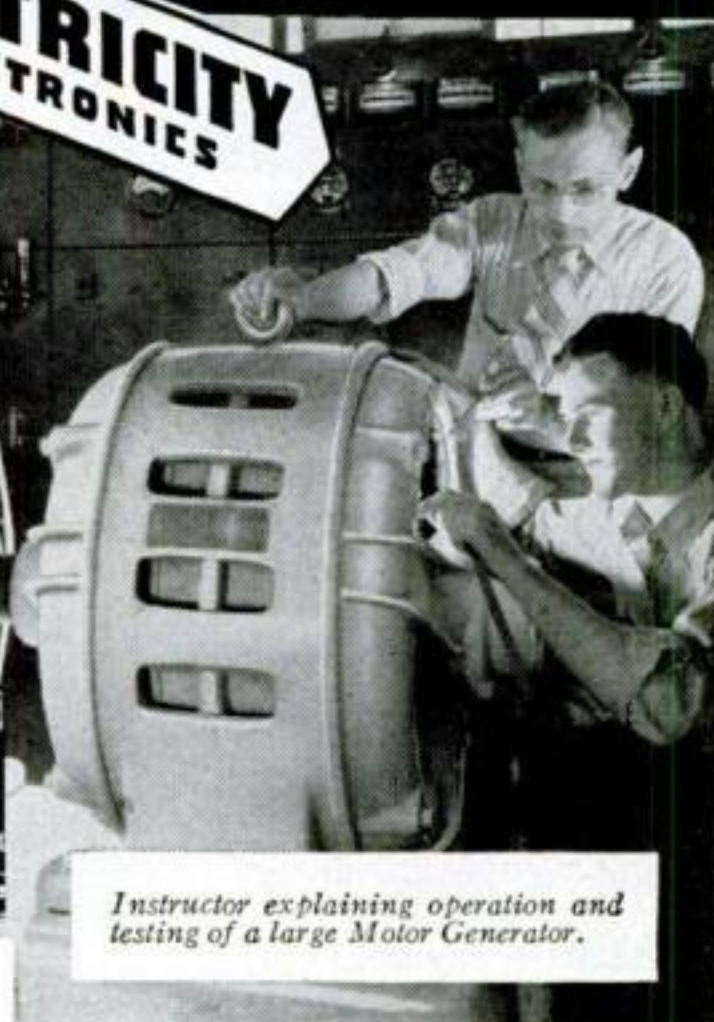
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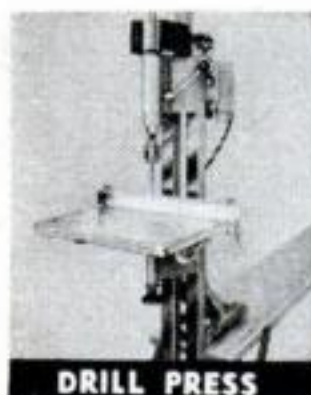


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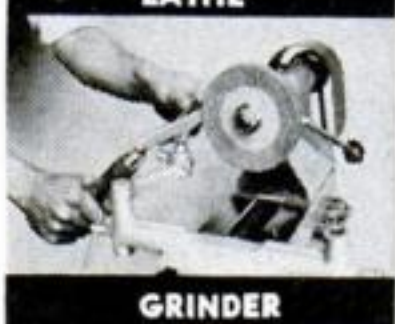
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Letters



Good Jokes Never Die

Shame on the judges of your Model T contest for choosing an oldie as the winner! It was told about a locomotive engineer before Henry Ford made his Model T. The engineer was having trouble stopping the locomotive at precisely the right spot in the roundhouse. After he had gone in and backed out repeatedly, his friends began to kid him, and he shouted back, "Well, why didn't you shut the door while I had it in?"

JOSIAH T. BLANK, Council Bluffs, Iowa.

Hmmmm! Well, anyhow—at the request of the Ford Motor Co., the nearly 3,000 Model T anecdotes we received from PSM readers have now been turned over to the Ford Archives at Dearborn, Mich., for permanent preservation as the POPULAR SCIENCE Model T Collection.

Canadian Tribute to PSM

While your article on the Canadian Postal Service [Dec., p. 116] was written with a very broad sweep, it nevertheless conveys a very true picture of the Service in action at the peak period of the year.

I am also very much impressed by the imagination shown in the treatment de-



cided upon for the pictures. While your readers may be surprised by the innovation, I am sure they will also be pleased and appreciative. I am certain of this because while I feel that the regular reader of POPULAR SCIENCE MONTHLY is a very practical person, he is also an individual who is not very happy in ruts, and he would not be a reader



INVENTORS



Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

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JANUARY 1954 15

STOP WISHING • START ACTING

Get into TELEVISION!



**He Earned EXTRA MONEY
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NOW Future Looks Bright!**

"Before I decided to quit wishing and start acting to get into Television, I used to be envious of trained people. I saw your ad telling of opportunities in this field and answered

LET THE BEST IN TV TRAINING

TELEVISION—America's fastest-growing Industry—needs THOUSANDS of trained TV Technicians. But the RIGHT Training is Vital. Don't settle for less than the BEST. The C.T.I. Home-Shop Training Plan is 100% TELEVISION—not just another Radio Course with some TV Lessons tacked on. Get ready NOW to CASH-IN on TV's great money-making opportunities. Take a Big-Pay job—or have a BUSINESS OF YOUR OWN! FREE Book Explains. Send Coupon Today.

Many Other C.T.I. Men Are Also Succeeding

**Will Do \$18,000
First Year in Own Shop**
"I am now half owner in AGS Radio and TV Service at Greensboro, N. C. Our shop is one among many in this section. Yet we have a reputation that is bringing us business from other towns. If it keeps growing, we will probably be looking for a C.T.I. graduate to hire. The present trend indicates we will do around \$18,000 the first year. C.T.I. training is one of the best investments anyone can make. I am still enjoying my C.T.I. Television Set which I built while taking my Course." GRADY M. FOGLEMAN, Burlington, N. C.

**NOW \$3.00 an Hour
in TV Service Work**
"The C.T.I. course is practical and each step is very clear. Instructors are very cooperative and explain every detail. I am going to open a small TV service shop of my own very soon. C.T.I. training has meant a lot to me. I am doing TV service work now. I make \$2.25 per hour. After 8 calls per day I get \$1.25 extra for each call. That nets me \$3.00 or more per hour." FRANK E. KLAYBOR, McHenry, Illinois

says John Grillo

the ad. Without a doubt the best decision I ever made was when I decided to take the C.T.I. Television Course.

"I have friends who have studied Television through other schools. I have seen their courses and they have seen mine. Everyone of them admits that C.T.I. is by far the best course. Radio and television are quite complex but C.T.I. has made both subjects easy to understand and also very interesting.

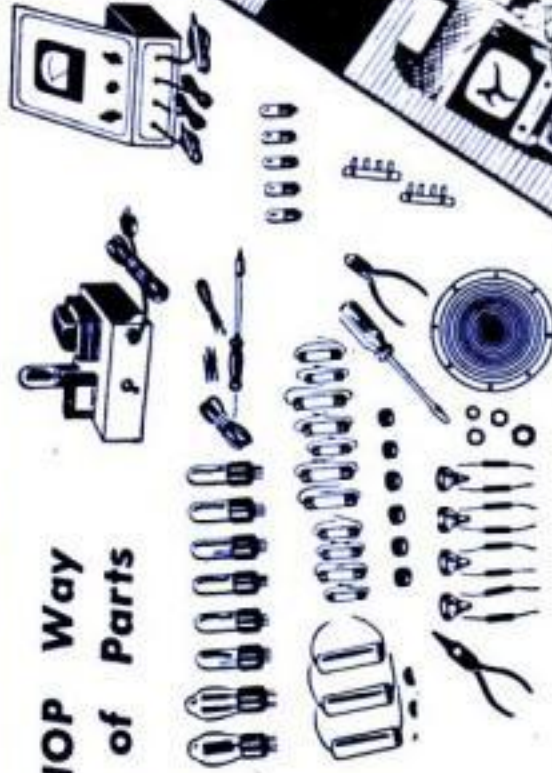
"I have enjoyed building my test instruments and

my own TV set. I have been using my test instruments in my service work. Three more lessons and my course will be completed. I have been servicing for several months now and have earned much more than the cost of the course. The lessons on systematic trouble-shooting are especially helpful.

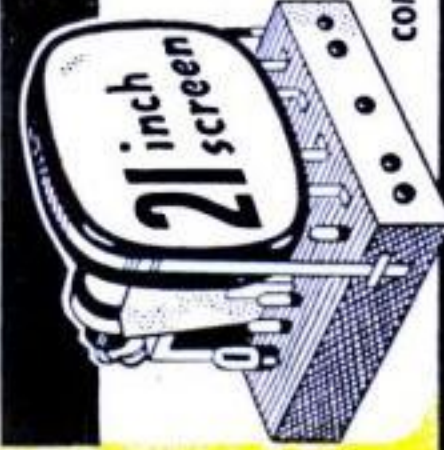
"I feel so much better now that I know something. To have training in a field which is proving to be the biggest field of opportunity for the trained technician gives me confidence and makes the future look bright." JOHN GRILLO, Charleroi, Pa.

Begin the HOME-SHOP Way with 20 BIG KITS of Parts

Along with your TV Course, you get 20—TWENTY—Kits of fine-quality Parts, Tools, Professional Equipment. You make Testing Instruments. Trouble-Shooting Devices, other Apparatus, to use on TV Repair and Service jobs. No experience needed when you learn the C.T.I. Home-Shop Way. These and many other features are explained in the Big FREE Book—"YOU and TELEVISION." Send for your copy today.



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While taking the Course, you also build your own Top-Quality, Big 21-Inch TV Receiving Set—with parts we send you —like the one John Grillo talks about. This and many other money-making features make the C.T.I. Home-Shop Plan OUTSTANDING. Get FULL FACTS about this Training and what it can mean to Your Future. Mail the Coupon—NOW!

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INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

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of your publication if his imaginative inquisitiveness did not take him there.

DAVID ADAMSON, Superintendent
Canadian Post Office Dept.
Ottawa, Ont.

Gr-r-r-r-r!

According to Mr. Meyerhoff's own story [Oct., p. 99], the dowsing rod goes down for him. He doesn't know why. He isn't interested enough to investigate, experiment or even wonder—yet he doesn't believe it! He's scared to death he'll find out there's something to it. A lot of folks are like that. They figure if they don't do anything about finding out about things, why, maybe, it just might be that the things would go off and hide and get lost. Well, they won't.

GASTON BURRIDGE, Downey, Calif.

It Depends on the Cow

On page 132 of your November issue, under "New Ideas from the Inventors," I see a man milking a cow from the wrong side. Yes, there are some cows trained to cooperate thus, but when I used to do the job the right side was the correct side of approach.

NOBLE E. PEELER, St. Paul.

It still is, for the unimaginative, run-of-the-mill cow. But, you see, our cow was a



friend of the artist and permitted certain liberties in order to show off the trick stool.

It Paid Him to Read PSM

I don't need to be sold on your excellent magazine because I have been a constant reader since 1939. At that time I lived in one of the islands of the British West Indies, and during World War II I paid as high as 42 cents (B.W.I. currency) per copy.

However, I made several times what the magazine cost me then by making and selling wooden toys from patterns given in your issues. Toys, as you will remember, were scarce then and anyone with the necessary tools, devoting all of his time to it, could have made a fair income in toymaking. I

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FRED E. CHAPMAN, Toronto, Ont.

What Were the Whizzers of '28?

I would like to know the names of a few of our 1928 stock cars that could do 100 miles an hour.

WILLIAM TABROSKY, Sharpsburg, Pa.

The Automobile Old Timers Club, which should know, disclaims any knowledge of 1928 cars that would do 100 miles an hour. We think probably the Stutz and the Duesenberg could. Anybody else got a candidate?

Those Silent Landslides

The article "Moon's Mysteries Challenge Spacemen" in the November issue was tops. However, the article states that a landslide would be awesome to a moon explorer because "it would happen in total silence—



there cannot be enough air on the moon to carry a whisper of sound."

Since air is not the only medium through which sound will travel, isn't it possible that the sound would be carried through the surface of the moon to the space suit of the observer, and that at least a whisper of a sound would reach his ear?

LLOYD E. PETERMAN, Willow Run, Mich.

A good question, but we think the answer is no. Presumably the quivering of the ground would be perceptible to the moon explorer. But it seems unlikely that vibrations of the frequency range of what we call sound would reach his ears through the feet of his space suit and, moreover, a cushioning layer of rock dust would be everywhere underfoot.

Keys and Straight Eights

I wish you would call it to the attention of Wilbur Shaw that Hudson, with all due credit to a good old independent manufacturer of excellent automobiles, is not the only one that uses the "round" ignition key. If he will again take a look at a Packard, he



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will find they have round, and not hex, keys. Also—what he said about L-head or side-valve motors in Hudson goes, but even more so, for Packard—the last perhaps to hold out with high-quality, high-compression simple L-head straight-eight motors that perform right up with the overheads and "V" motors.

L. G. GLENN, M.D., Protection, Kansas.

Score one for Dr. Glenn on round keys. And include Pontiac among the rugged straight eights (see p. 120).

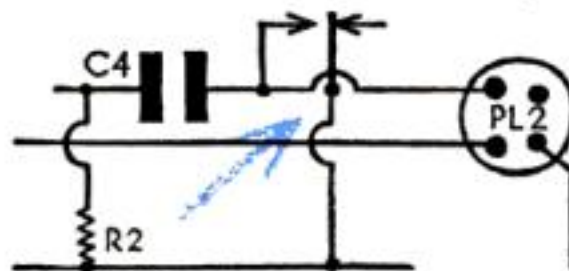
How to Avoid a Short Circuit

In the circuit for the receiver unit of the radio-controlled tractor described in your August issue [p. 191], no transformer specifications are given. What should I use?

And in the wiring from PL2, wouldn't the connection at the armature of RY3 short it to one of its own points?

DAN BRANISEL, Cleveland, Ohio.

Sharp-eyed reader Branisel is right. There should be a crossover loop at this



point. The corrected diagram is shown here. A UTC S03 transformer was used in the reversing circuit.

Credit Where It's Due

There was a picture of me holding some special lenses on page 177 of your October issue. The caption said that I developed these lenses.

While I played a part in the original testing of them, the real developer is Dr. William Feinbloom, of Columbia University.

ROBERT GRAHAM, Los Angeles.

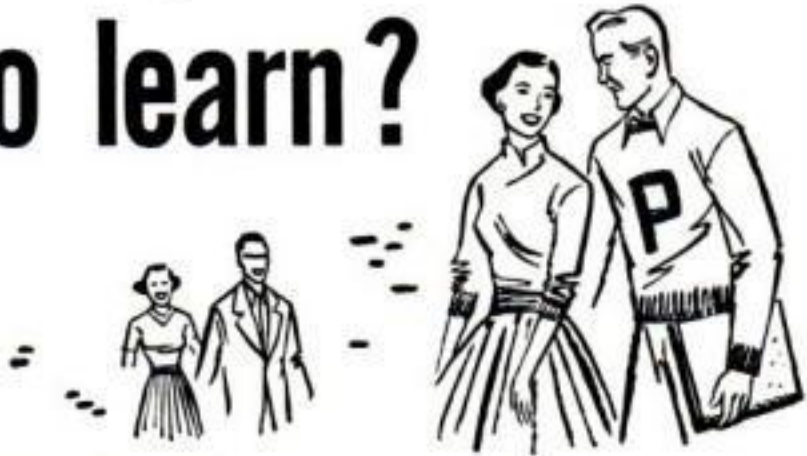
Through Hell's Canyon on Foot

I thoroughly enjoyed reading Richard Neuberger's article "Is Grand Canyon's Rival Deeper?" [Oct., p. 126] for I was one of an eight-man level unit of the U. S. Coast & Geodetic Survey that went through Hell's Canyon of the Snake River on foot during the summer of 1947. Three bateau-type boats were used for transporting our supplies through the canyon. It took us five days to negotiate and survey 20 miles of the canyon on foot.

CAYCE PRESNELL, Wilkesboro, N. C.



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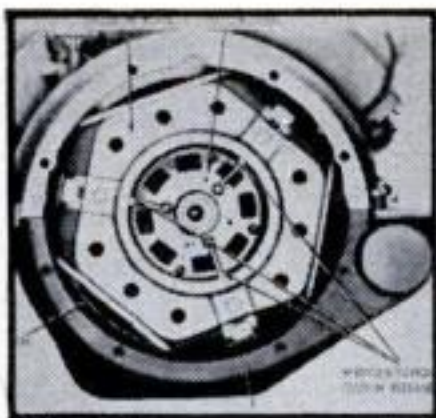
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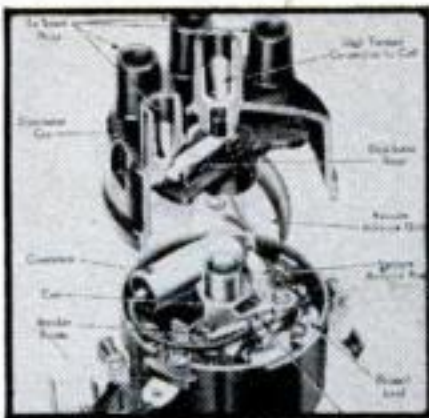
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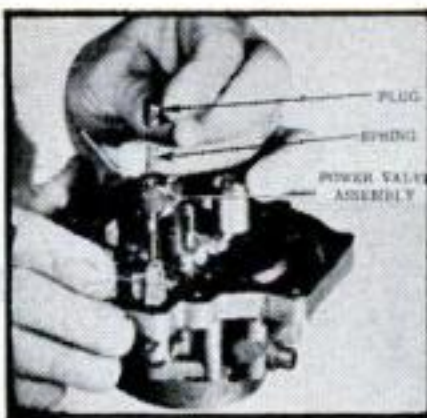
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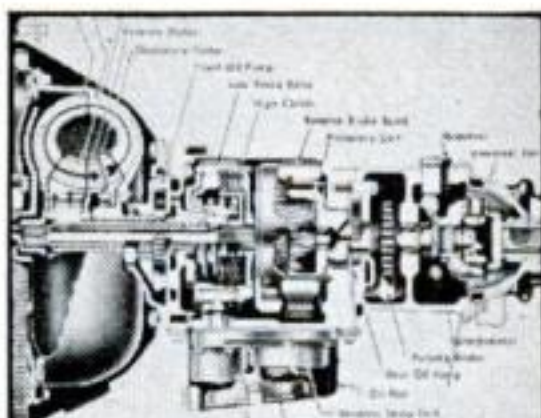
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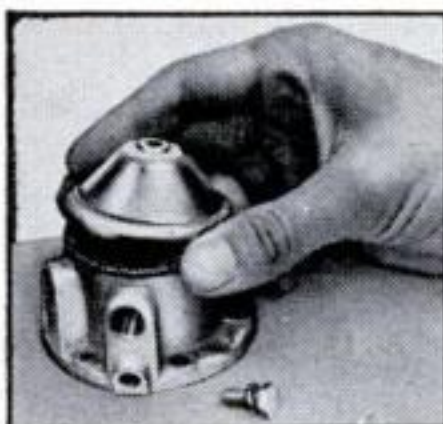


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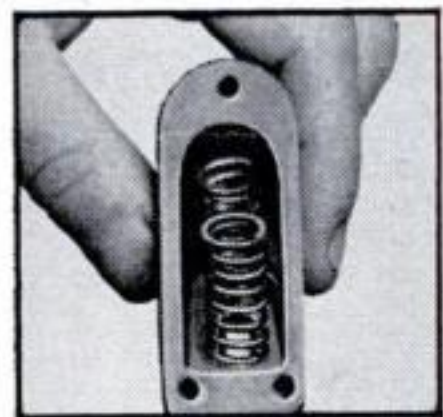


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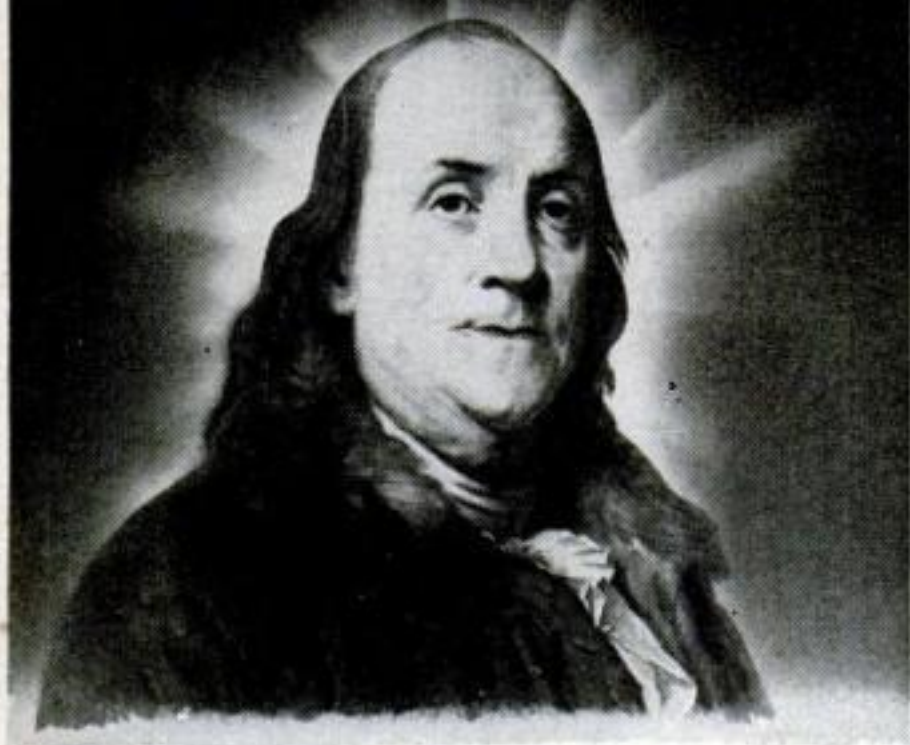
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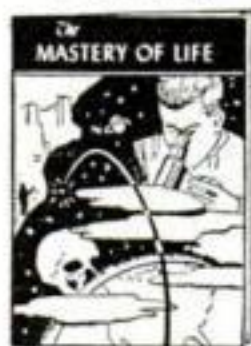
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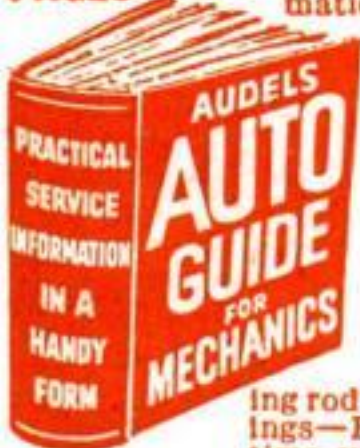
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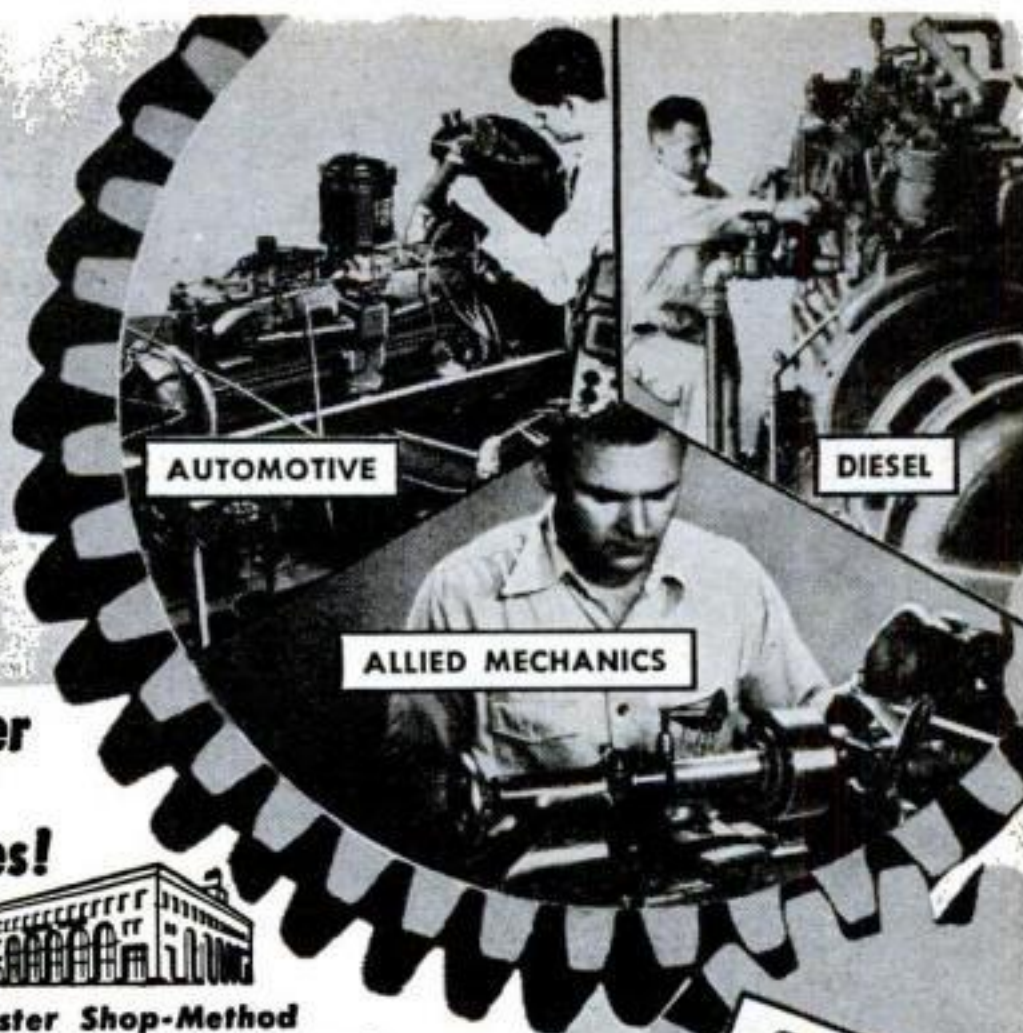
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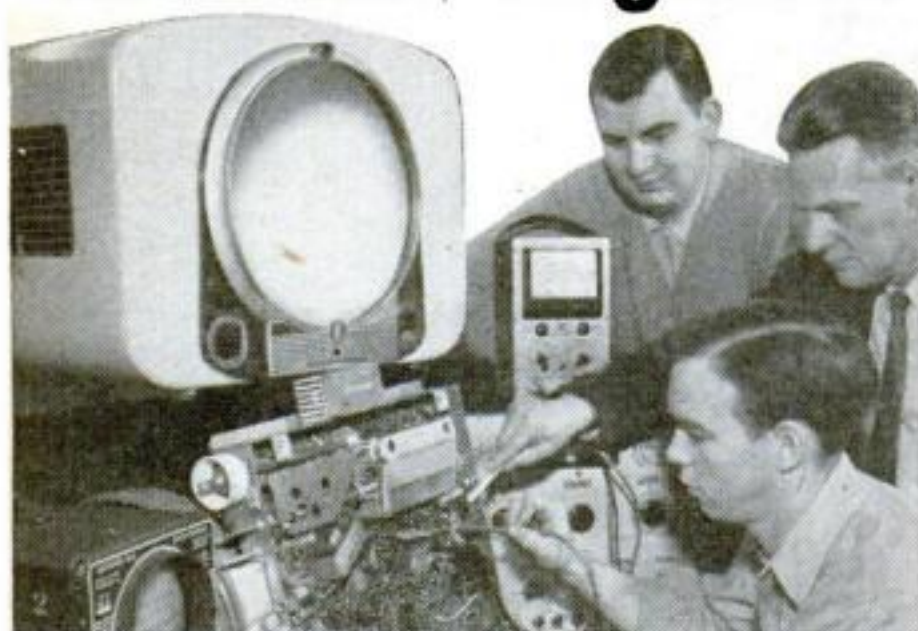
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WOULDN'T YOU like to be making the kind of money R. E. Meade made? Of course, not everybody makes such profits on the very first day. But, how do you like profits like these: A Florida salesman earned \$600 in one month. An Ohio man earned \$2100 in 2 months. A New York salesman earned \$1500 in one month. A New Hampshire salesman added the Presto as a *sideline* and picked up an extra \$1800 in 20 months.

Almost Two Million Already Sold!

PRESTO contains an amazing new chemical "Chlorobromomethane" or "C.B." developed as a secret defense against fire during the war. In comparing the effectiveness of "C.B." in fighting various kinds of fires an authoritative testing laboratory states: "It has been proved that 'C.B.' is about 1.5 to 6 times as effective as other common extinguishing agents on an equal weight basis."

This extra effectiveness of "C.B." means that Presto can be made light and handy enough for even a woman or child to use. Just a twist of the knob . . . and flames disappear! "Sells on sight" to civil defense workers, owners of homes, cars, stores, farms, service stations, boats, motorcycles, factories, offices and to stores for re-sale.

Why Large Presto Profits Are So Easy

Everyone is terrified at the very thought of FIRE! Every year fire kills more than 11,000 people. Most people who see Presto in action want one or more—ESPECIALLY WHEN THE PRICE IS ONLY \$3.98 EACH!

You can demonstrate Presto in a few minutes, and every sale will net you \$1 or more. We refill your demonstrator free . . . and we give you dramatically powerful printed sales material to "talk from" . . . free certificates testifying that Presto is GUARANTEED FOR 20 YEARS.

Advertised in Life and Other National Magazines!

YOU DON'T NEED TO INVEST A PENNY. Just collect and keep \$1 or more every time you write an order—we collect the balance and deliver the extinguisher. (Or if you wish, you can buy from us at extra-low wholesale prices and then make up to \$2.18 profit per unit supplying both dealers and retail customers—we'll send you free details.)

START NOW—MAIL COUPON

Get started in this rich new field now. Don't "put it off"! Every day you hesitate may cost you \$10, \$15, or even \$50 you could otherwise be making. Mail the coupon below NOW for everything you need to get started right away!

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| Weighs Less Than 1 Lb. | Guaranteed for 20 Years—Certificate is Packed with Every Presto |
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Best Selling Months Are Here! Don't Delay—Mail Coupon Now!

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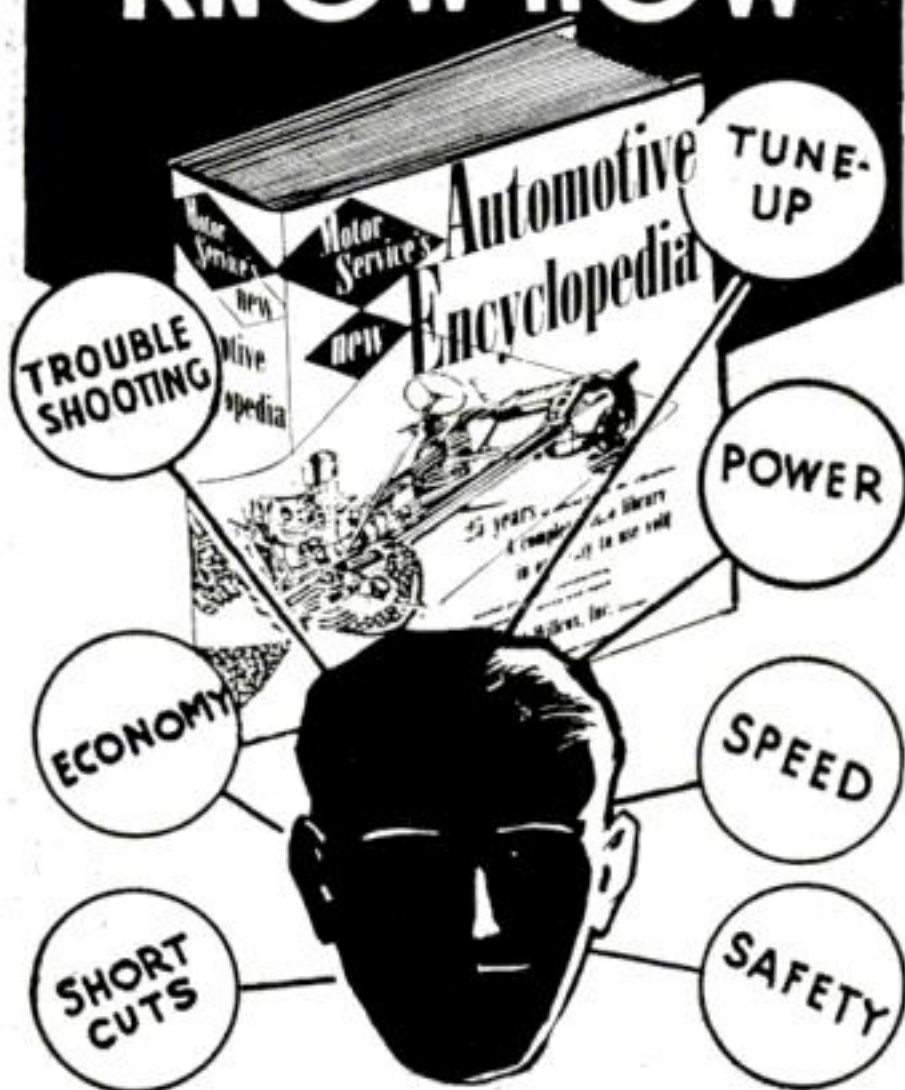
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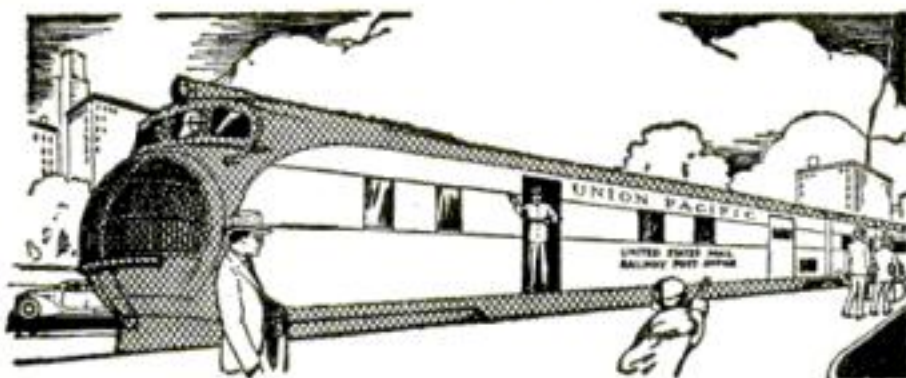
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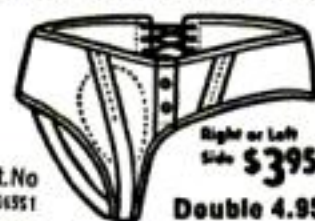
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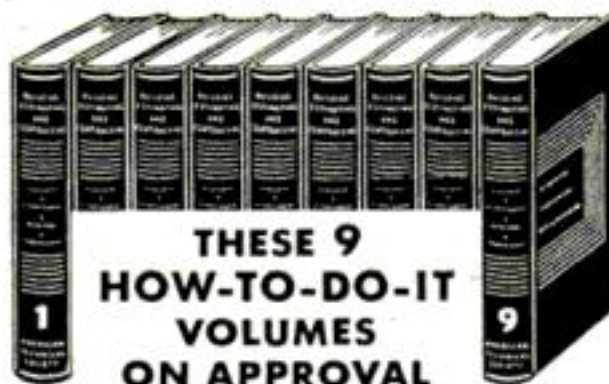
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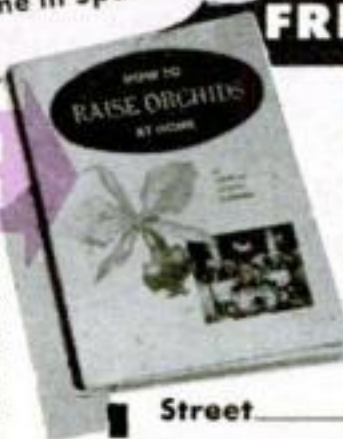
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Start on a SHOESTRING!

The real-life stories of success in Mail Order read like fairy tales. If I had not personally known these people their stories would be hard to believe. Yet they are not only true, but they represent just a few of the hundreds of "little operators" who have been swept into big money by Mail Order.

GAINES. I personally guided his start when he invented an automatic pants presser. He started with one little ad in one magazine. Four years later he retired — with enough real estate to keep him in cash income the rest of his life.

VAN MARK. I worked with him for six years. I met him when he was a wagon man for a tea and coffee house, knocking on doors. He went into Mail Order on nothing—made money from the start—ended up six years later with savings of \$50,000 and an income of \$5000.00 a year for life without further work.

DUGGAN. A few years ago he was a truck driver. Started fooling with Mail Order in a spare room in his spare time. Last year he said, "I don't know how much I'm worth—after you get the first million you quit keeping track."

MRS. NIXON. Started a small Mail Order business at home—just to keep occupied. It looked good and she came to me for advice. I showed her how to expand. In two years the business got so big her husband resigned his job to help manage it.

FOXMAN. Foxman worked as a hack writer at \$70 a week. He had idle time in the evenings—ran an ad offering something he didn't have—got so many orders he had to find a source of supply. He made \$18,000 the first year. He gives me credit for "showing the way."

JORGENSEN. Consulted me about a specialty product. On my advice he ran one ad to "test" its saleability. That ad brought sales of \$50,000. In his first year he did a business of nearly a half million dollars. His original investment was less than a thousand.

These things I have seen. These people I have helped to the realization of their dreams — these and hundreds of others. My own fortune was made in Mail Order. And now my secrets can be yours.

L. W.

Have you ever thought of running a profitable little sideline right from your home? Has it occurred to you that you are just as capable as anyone else of making money on a product or service that can be sold by mail? Have you ever looked into the Mail Order business as it's run (on tiny investments) by innumerable small operators?

Forget about Sears and Ward's! Read about the "little fellows" . . . clerks, teachers, vets, mechanics, salesmen and others . . . who are packing Mail Order items in bedrooms, spare rooms, attics, garages, cellars . . . dumping them in the Post Office . . . and quietly banking the fistful of Money Orders, cash and checks delivered to them daily by the mailman.

An annual business of almost a billion dollars is done by "little fellows" who advertise and sell just one item! The Department of Commerce of the United States says, "A number of the most successful obtain incomes as high as \$40,000 to \$50,000.00."

It's an incredible story . . . a story of a business that's wide-open for newcomers . . . with opportunities for income far-and-away greater than you can ordinarily hope to attain by holding down a job. And in Mail Order you can stay as small as you wish—run your deal as a \$50 or \$75 weekly sideline—or consider jacking it up into really big figures as a full time operation.

Glance at the examples at left. These true stories are far from unusual. Multiply them by the hundreds and you begin to get an idea of what can be done . . . what is being done . . . in the phenomenal Mail Order field.

Yet, if you were to jump blindly into Mail Order your chances would be slim. A peculiar brand of "know-how" is vital in this little-known, little-understood business. This is fortunate for you. If any Tom, Dick, or Harry would "click" in Mail Order, the field would have been overloaded years ago.

But now you have the opportunity to learn the authentic secrets of successful Mail Order operation. They are revealed for the first time, step by step, in an extraordinary new Survey . . . the L.W. Confidential Mail Order Letters.

This Survey is not a course—not a book—not a group of lessons. It is a simple guide that anyone can follow. It shows you how to pick the right product for Mail Order. It shows you exactly how to start a profitable business fast, with cash or Money Orders in the envelopes you receive. It shows how to buy your product out of the very money you get in the mail, so you don't have to tie up cash in large supplies of your product. It gives you actual examples of ads and letters, analyzed to show how and why they make money. It demonstrates the months to start, the time to expand, the best way to get prospects' names. It reveals from A to Z the confidential facts that have made fortunes for Mail Order operators who use them.

Mail the coupon today, or simply send your name and address on a postcard. No salesman will call. We will mail, postage prepaid, a Free copy of "How to Become a Mail Order Millionaire" and along with it will give you complete facts about the L.W. Mail Order Survey. Read the facts. Then decide whether you would like to spend spare time or full time in a profitable, fascinating Mail Order enterprise. If you think you would like to follow the footsteps of hundreds of others who are now making good money in this way, you can get your L.W. Survey and begin at once.

Please don't decide to write us "a little later." Send your name now, before you forget. This one little act might be the first step to a future of independence and wealth.

**The L. W. MAIL ORDER SURVEY, Dept. 31
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**The L. W. MAIL ORDER SURVEY, Dept. 31
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Mail me a free copy of "How to Become a Mail Order Millionaire" and details about the L. W. SURVEY. It is understood there is no charge at any time, and that I am not under the slightest obligation. After reading, I will decide whether I want to use the L. W. Confidential Letters to help me start a Mail Order business at home.

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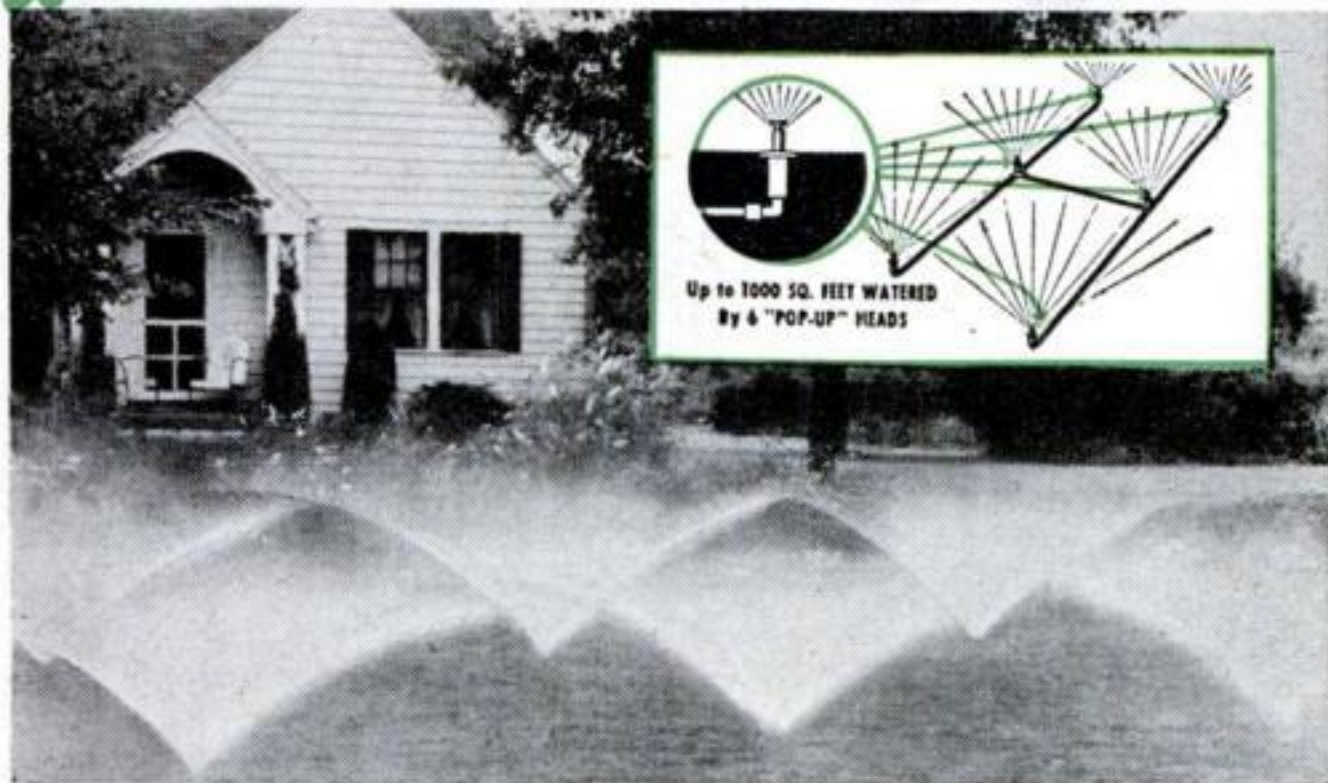
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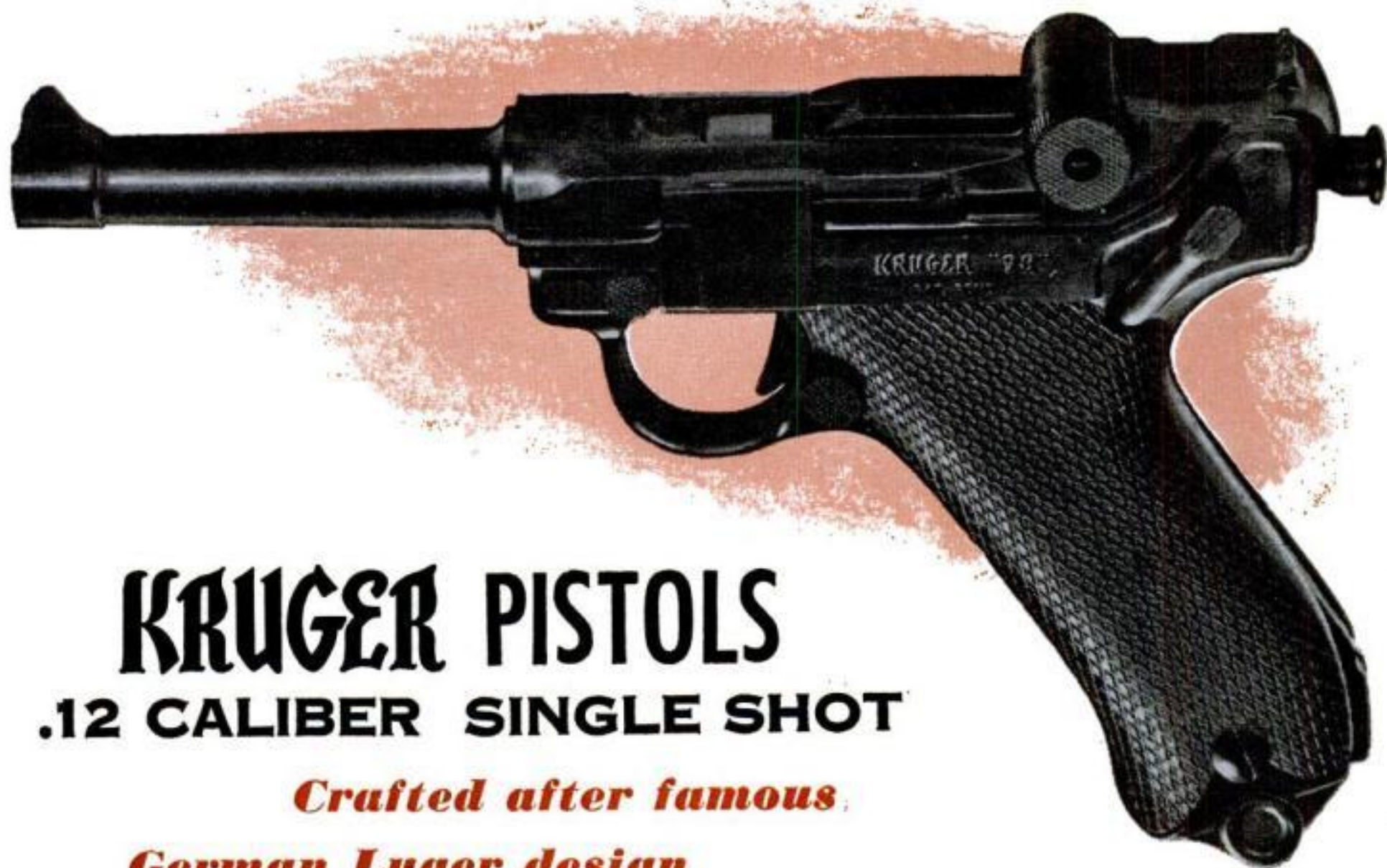
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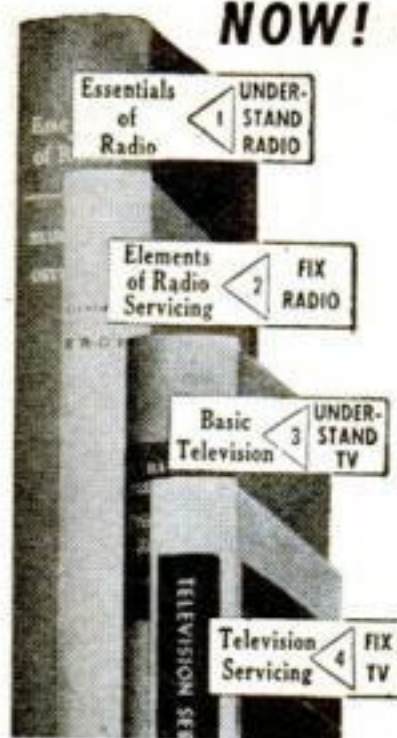
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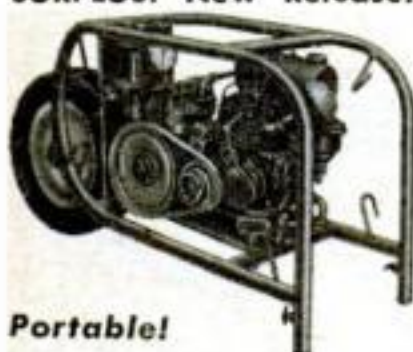
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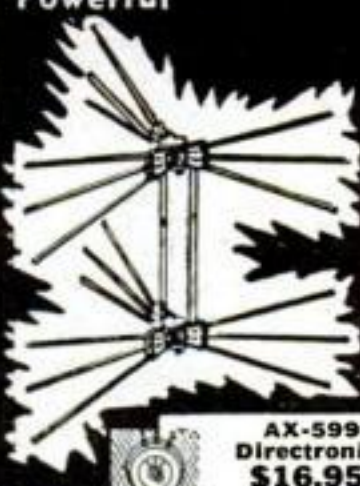
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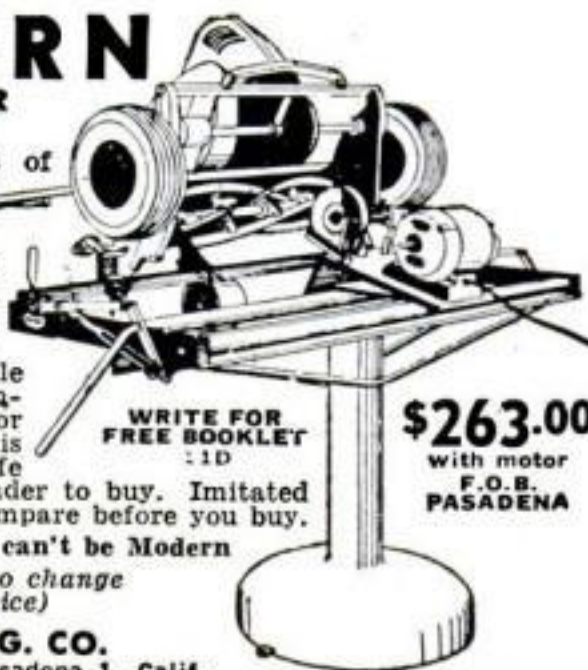
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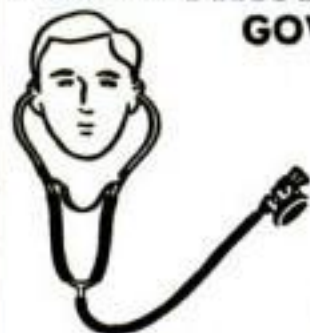
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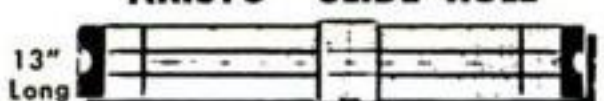


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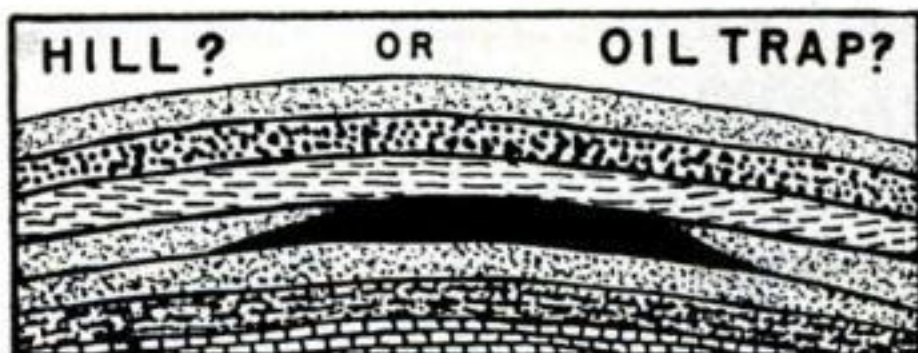
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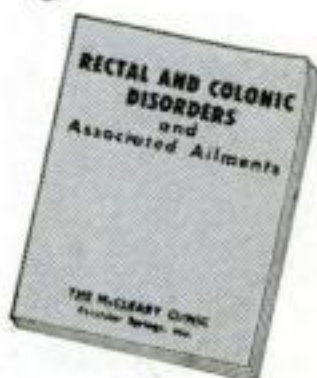
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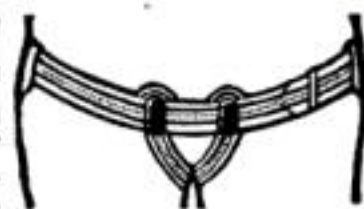
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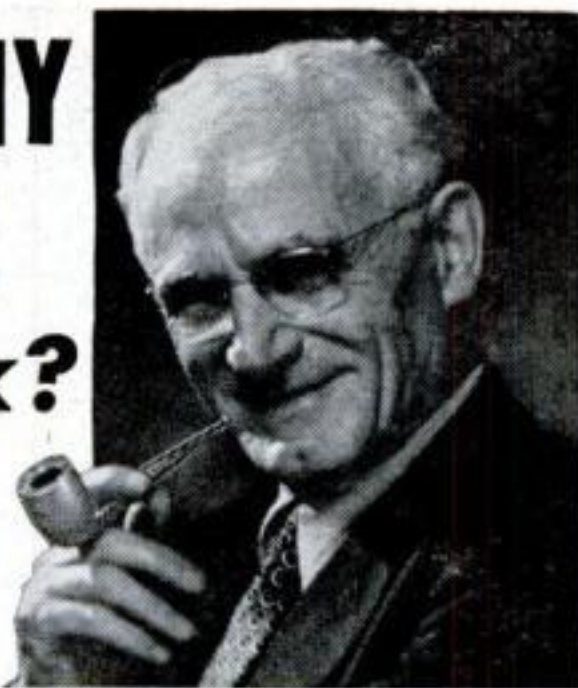
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GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$4,165.00 in few weeks. Free Book. Washington Mushroom Ind., Dept. 178, 2954 Admiral Way, Seattle, Washington.

\$40.00 DAILY With inexpensive sawshop equipment. Zapart, 586-A Manhattan, Brooklyn 22, New York.

NEED Money? Want independence. Be your own boss. Start home mail order business on shoestring. Free information. Cox, Saugus 9, Mass.

NEWSPAPERS. Turn them into cash. Eighteen methods. Instructions 50c. Charles Company, 12-EBK, Norwood, O.

WANTED! Home Producers, by manufacturers in our Clearing House Service. Become a subcontractor, casting plastic products for these companies. Thousands of easy-to-make items required. Cash in at home, without previous experience. Plastic Service Associates, Dept. 1-PS, East Boston 28, Mass.

START A Buying Service, buy wholesale thousands nationally advertised products. Make big profits selling at sizeable discounts. Postcard brings details. American Buyers, 627-T Linden, Buffalo, N.Y.

EARN Extra Money weekly mailing circulars for advertisers. Complete instructions—25c. Siwaslan, 4317-B Gleane Street, Elmhurst 73, New York.

FREE! "301 Profitable Small Businesses!" Amazing shoestring plans! Work Home! Start Sparetime! Deumant Surveys, Kenmore 23-S, New York.

OPERATE Profitable collection agency. Big Money. Free booklet. Franklin Credit, Roanoke 7, Virginia.

\$1000 A Week Possible With Great Triple Profit Plan. Edikara, Johnstown, Penna.

OWN. Operate. Route—"Wishing Wells". Place these New \$8.50 Skill Games on counters in Cafes, Clubs, Luncheonettes, etc., collect coins weekly. Write "Legalsheres". Box 929, Long Beach 1, California.

"MAKE Perfume" and other profitable products. Catalogue Free. "International". 6347 Parnell-PS-1, Chicago 21, Illinois.

NATURAL Molding Latex. Extra Thick. Free Sample. Flock, Tinsel, Supplies, W. Wooley, 115-B Donald, Peoria, Illinois.

TO \$40.00 Weekly. Spare Time. Home Operated Mailorder Business. Successful "Beginner's" Plan. Everything supplied. Lynn, 10420-C National, Los Angeles 34, California.

TIN-Cans. Turn them into cash. Nine methods. Instructions 10c. Charles Company, 12-EBH, Norwood, Ohio.

MAKE Tough Durable Plastic of waste—easily. Makes attractive, resilient floors, walls, built-ins Stucco. Build good home for half. Bays Laboratory, Oklahoma City 9.

BUY Bankrupt, closeout bargains! Toys, Novelties, Household items, etc. Many 15c-20c on the dollar. Also 100,000 items wholesale. Free information. Box 591, Lynn 9, Mass.

BUY Wholesale thousands items. Lists Free. Cottage Industries, Omaha 12, Neb.

POPCORN and Potato Chip Equipment. LECO, Box 933-B, Springfield, Ohio.

\$5,000 YEAR possible. Renting tools, floor sanders. Plans \$1.00. Circular free. Carlton, 3007 Wharton, Philadelphia 46, Penna.

BUY Wholesale nationally advertised appliances, watches, etc. 1000 items for Christmas Catalogue 50c. International Sales Company, Dept. B, 175 Fifth Ave., New York 10, N. Y.

BUY Wholesale thousands nationally advertised products. Save money! Make Money! Postcard brings details. Kemah Company, 5017-E Washington, Houston, Texas.

LIQUID Rubber. make flexible molds. Free Sample. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

OPERATE profitable mailorder business. Splendid opportunity. For details write Harrison, Box 23, Bellflower, Calif.

EARN \$15,000-\$30,000 annually. Franchise protected. Guaranteed minimum \$12,500 or money back. Live at home. No merchandise to buy. Self-employed. One of most exclusive and noncompetitive businesses in United States and Canada. Send 50c for explanatory book. Money refunded when book returned. Harrell & Company, Box A-2, Louisville, Illinois.

MAKE Perfumes And Cosmetics At Home. write "Carey Laboratories." 1914 Chouteau, PS-1, St. Louis 3, Missouri.

MAILORDER—Operate profitable home business using Free Advertising Method reaching millions. Revealing information free. H. G. Seidel, 7070 Hollywood Blvd., Hollywood 28, California.

ELECTRO-plating. Profitable home business. Autoparts, mirrors, novelties, gift-ware, baby shoes. Easy, inexpensive home processes. Free booklet. Tyco Metals, Box 13231-CP, Houston 19, Texas.

START your own profitable home mail-order business! We supply everything! Write today! Studio Products, Box 564-"D", Glendale 5, California.

OPERATE "Escalator" Mailorder system, selling our products or any products. Fastest, most revolutionary mailorder system known. Write: Selbyco, Decatur 164, Ill.

MONEY in new greaseless doughnuts. Start in kitchen. No smoke. Sell stores. Free recipes. S. Ray Co., 3605 South 15 Ave., Minneapolis 7, Minn.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries, Grand Rapids, "Minnesota."

50 MAIL Order Plans full or Spare time catalog free your name address. Lindholm Service, Box 2504, St. Ann Station, Minneapolis, Minnesota.

YOUR Ideas should pay. let us manufacture and market your pet gadget for you. Ideal Machine and Tool, 4114 Olive, St. Louis 8, Missouri.

MOLD Making Liquid Rubber; quarter pint sample with instructions. \$1.00 postpaid. Plastercraft Supply Company, 3051 St. Clair Ave., Cleveland 14, Ohio.

MAKE Money mailing cards; circulars. Pleasant; Profitable. Paton, Box 55-A, New York 23, N. Y.

PLEASANT Spare Time Work. Write RTK, Box 6693-C, Cleveland 1, Ohio.

MAKE flexible molds! Cast plaques, bookends, figurines! Free sample! H. Tooker, 630-A Chestnut, Hamilton, Ohio.

NEW Exceptionally profitable plans, ideas for home operated mail business. Rush name. Miller, 1772-R Carlyon Road, East Cleveland 12, Ohio.

BUY Wholesale. Make, save money. Sensational details. Younge's, Kent, Ohio.

BE appointed Notary Public. Details free. Magnolia Press, Box 1272-S, Burbank, Calif.

HAVE Home Mail Business—Get \$10 Orders In Every Mail—Keep \$8.00. Everything Furnished. Hutchinson, 401C Adams, Dorchester 22, Mass.

DO Mailing At Home—Get Orders In Every Mail. Keep Every Cent. Everything Furnished. Genmerco, Box 142-N, Dorchester 24, Mass.

WHAT'S Your Field Of Interest? Whatever it is, specialized magazines will help you get ahead. Examine current copies of those covering your field through our Easy-to-Get-Acquainted service. Choose from 4,387 covering all fields—business, trades, agricultural, professions, insurance, real estate, music, educational, hobbies, sports, etc. Current List Free. Commercial Engraving Publishing Company, 34S North Ritter, Indianapolis 19, Indiana.

START home mailorder business—Details. Gedgard, Box 798-F, New York 1, New York.

HALF Pound package interesting mail. Only 50c. Supkow, Blackwood, New Jersey.

FREE! Mail order book! Ramshead Publications, Gibbsboro 5, New Jersey.

MAN Wanted—Are you dissatisfied with your work? Would you like a business of your own? If so, write Rawleigh's, Dept. A-GG-PSC, Freeport, Illinois.

UNPAINTED Figurines. Weaver's Statuary, 1524-P Second Avenue, Altoona, Pennsylvania. Catalog.

\$250 WEEK reported! Free book "505 Odd, Successful Businesses." Work home! Expect something Odd! Pacific-360, Oceanside, California.

WOMEN! Make Big Money at home. Sew ties for us. It's fun. Earn \$10 day easy. No selling, no experience, no machine necessary. We supply everything. Help us fill huge demand. Exciting details free. Fashion Ties, 2521-X, Manchester, Inglewood 4, California.

STRIKE It Rich in your own Business, full spare time! Authentic "New Guide", gives concrete instructions; explains "Ways to Make Money, have Happiness, Success!" Start with little, snowball to Plenty, Independence! This thrilling "Guide", helps find your lifetime opportunity! Further details Free! Wonderful Products, Box 2113-D, Santa Fe, New Mexico.

FREE catalog, samples. Printing at wholesale prices. Dealers wanted. Sutton Printing, Box 853-N, Waycross, Georgia.

\$50-\$100 WEEKLY working spare time at home! No courses or merchandise to buy! Pacific Advertisers, Box 4097-BR, San Diego 4, California.

EARN Big Money with few hours work each week in your own mailorder business. Free details. Mailord Company, Dept. PS-14, Southampton, New York.

FREE Instructions "Metallizing Baby Shoes". Mountings, Fosters, 1520 Ardmore, Chicago.

EARN Spare Time Money! "Money-Getter's Magazine" teaches you How! Copy, 15c at New York newsstands or G.P.O. Box 972-PS, New York 1.

EARN Big Money at home. Make new, different decorative craft of wire. Experience and investment unnecessary. Profit from first items pay initial expense. Complete plans \$3.00. Brookside, Box 423, Kenmore, Washington.

500% PROFIT Lifetime Opportunity. Write. Atlantic, Box 222-J, Far Rockaway 91, New York.

EARN \$2.00 Hour! I do—making Sandals. Youngs, 1308-PS South First, Arcadia, California.

START a lettershop on a shoestring! Sales \$56,000. Started \$36.00. Information? Wells, Box 13, Basking Ridge, New Jersey.

\$2,000. MONTHLY—Easy. Instructions Free. Sundbergs, 1552 Essex, Willow Run, Michigan.

\$15.00 THOUSAND Possible — highest prices compiling mailing lists and addressing from them; longhand, typewriter. Particulars free, Almon Torrey, Rowley, Mass.

EARN Money With Typewriter—Sewing Machine. Details Free. Edwards, 3915-PS, 12th, Des Moines 13, Iowa.

BUY it wholesale. Manufacturers, Distributors. Over 850,000 items. Literature free. Olsen, 1231-B East Third St., Duluth 5, Minnesota.

BUILD luggage and cases at home. We sell your product. No special tools or equipment needed. Free details. Casecraft, 805-X1 Sunset Blvd., Los Angeles 12.

UNUSUAL homework opportunity. Spinning Angora Sparetime, Men, Women. Angora House, PSM, Springfield, Illinois.

DRUG Sundries Wholesale. Men, Women. Illustrated list 25c coin. P. B. Ally, 1123 Ellicott, Buffalo 9, N. Y.

EARN money at home, making rhinestone jewelry. Free catalog. Ebert, Box B183, East Orange, New Jersey.

RAISE Earthworms for profits. Details 25c. Earthworm Gardens, Dept. PS1, Box 428, El Monte, California.

MAIL order success assured with know-how. Our new publication reveals profitable operation. Free details. Funkhouser-Gart, 133 Montgomery Street, Highland Park, New Jersey.

\$46 FROM Square Foot Plywood; Jigsaw necessary. Write: Woodart, Bridgewater, Mass.

PLASTERCRAFT molds, liquid rubber, plasters, paints. Catalog and Manual free on request. Jayhawk Plasters, Blue Rapids, Kansas.

MAKE \$100.00 Weekly Mailing Merchandise Catalogs, Bearing your name. Sample catalog, details 25c. Products, 526 Western, Chicago 12, Illinois.

FOR the best mailorder deal in America, write Modern Enterprises, Cynthiana, Ky.

\$26,500 SALES in Two Weeks! Amazing Radio-Mail order method. Free details. Broadcast Service, 1412-Y Great Northern Building, Chicago 4, Illinois.

MAKE Money selling by mail. 10,000 word booklet for beginners. 25c. Assoc. Distributors, 7401 MacArthur Blvd., Oakland 5, Calif.

SAWDUST. Turn it into cash. Twenty methods. Instructions 50c. Charles Company, 12-EBG, Norwood, Ohio.

SENSATIONAL Home Plastic Business. Men and Women make Big Money. Spare or Full Time. (Also Valuable Liquid Marble information.) Free Catalog . . . Write: Bing Products, PS-154, Watertown 72, Mass.

PROFIT Without Investment! Through our Watch-Clock-Jewelry-Camera-Binocular Repair Service. Inquire. Modern Technical Supply, 55-PS West 42nd Street, New York 36.

NEED capital? I'll tell you how and where to get it. Write. Dougherty, Box 88J, Van Nuys, Calif.

38 **MONEYMAKING OPPORTUNITIES**

SELL Titania gems; \$9.75 carat wholesale. More brilliant than Diamonds. Free catalogue. Diamonite, 1404-S Mitchell, Oakland 1, Calif.

SPARETIME Profits Taking Subscriptions. All Magazines. Wholesale Catalog Free. Cassell Agency, Westfield 1, N. J.

DETECTIVES Earn Big Money. Experience unnecessary. Detective Particulars free. Wagoner, P-125 West 86th, N. Y. 24.

SCHOOL Seniors—Sell Classmates America's most beautiful Graduation Name Cards. Largest selection. Highest commission. Outsell all others. Free sample kit. Printcraft, Dept. P, 1509 Maple St., Scranton 5, Penna.

MAKE Money addressing Envelopes! Our information reveals how. Only 30c. Business, Dept. 45-A, P. O. Box 2224, St. Louis, Missouri.

MAKE Money—At home by mail. Fast, Easy. Liebig Industries, Beaver Dam 2, Wisconsin.

\$10,800 PROFITS! Your Own Mailorder Business! No risk! "Success Plan" Free! Treasury, 709 Webster, New Rochelle PS-19, New York.

ADDRESS advertising postcards. Must have good handwriting. Lindo, Watertown, Mass.

\$500,000 BY mail from home. Free Folder, Publicity, Kalamazoo 65EE, Mich.

WORK At Home. Typists, longhand addressers. Prepare mailing lists and address literature. Be your own boss. Details free. Suppliers Mailing Service, 5591 Western Ave., Buena Park 9, Calif.

START A Buying Service. buy wholesale thousands nationally advertised products. Make big profits selling at sizeable discounts. Postcard brings details. American Buyers, 630-T Linden, Buffalo, N. Y.

NEW Plastic Mending Tape. Just press on! Repairs clothing instantly. Lightning seller. Samples sent on trial. Kristee 100, Akron, Ohio.

HOMEWORK! We Pay Cash! Experience Unnecessary! Hirsch, 1301-B Hoe, New York City 59.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$4,165.00 in few weeks. Free Book. Washington Mushroom Ind., Dept. 179, 2954 Admiral Way, Seattle, Washington.

BEAUTIFUL Feather Pictures. 200% Profit! Free sample. Apartado 9036, Mexico 1, D. F.

FREE! "301 Profitable Small Businesses!" Amazing shoestring plans! Work Home! Start Sparetime! Deumant Surveys. Kenmore 23-S, New York.

EARN Money Evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 2, Wisconsin.

MAKE to \$4.50 hour doing common pen lettering. National Artists, 301 1/2-C North Marsalis, Dallas 3, Texas.

\$210.00 WEEKLY Interest You? Details 10c. Sycamore, 13-PSJ, Oak Park, Illinois.

1000 MONEymaking plans! Folder free. Newton, 505 Cherry, Bonham 8, Tex.

WANTED: Typewriter owners. Make handsome profits. Write today. Groves Company, 682 Hastings 3, Nebraska.

MANUFACTURE Rhinestone and Pearl Jewelry at home. Latest creations, tremendous profits, no skill needed. Postcard brings illustrated catalog of settings, stones, etc. A. V. Cutt Co., Inc., 210-H Fifth Ave., New York 10, New York.

EARN \$50-\$100 Weekly operating Home Mail Business. Write, Lewis Bartlett, Richland, Georgia.

BUY Wholesale thousands nationally advertised products. Save money! Make Money! Postcard brings details. Kemah Company, 5017-F Washington, Houston, Texas.

WEEKLY extra income mailing circulars for advertisers. Apply: Enterprise, 21B Sanford, Mattapan 26, Mass.

WIN contest money. General Contest Bulletin gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609-A East 5th, Duluth, Minnesota.

BE appointed, outfitted. Notary Public. Thousands needed. Men. Women. World's lowest cost. Box 3025, Dallas 2, Texas.

ADDRESS envelopes at home. \$25 weekly possible, sparetime. No selling. Write, Temple Co., Box 946, Muncie 7, Indiana.

NEED More Money To Live On? Increase your weekly income \$20 to \$25 or more in spare time. Supply Rawleigh Products to Consumers. Also openings for full time Dealers. Write Rawleigh's, Dept. A-DD-PSC, Freeport, Illinois.

FREE Book "505 Odd Successful Businesses." Work Home! Expect something Odd! Pacific-35C, Oceanside, Calif.

BIG Profits In Spare Time! I'll send Assortment Full-Size Samples fine Foods. Household Necessities to ambitious Men-Women who need money. Friends, neighbors buy eagerly. Send no money. Just write Blair, Dept. 55MA-2, Lynchburg, Va.

FREE Folder! Make money—at home. Samuel Tell, Guaynabo, Puerto Rico.

YOUR ideas developed and sold free. Experienced consultants. Free information. Scientific Enterprises, Box 2100F, Cleveland 8, Ohio.

EARN Money—Mailing magazines etc. Pleasant homework, samples, details 25c. Rorick, Cincinnati 26, Ohio.

PIZZA shop operators now vacationing in Florida. Next winter it can be you. Send \$1.00 for detailed operating manual, and franchise request. Flippin & Co., Food Products Div., 119 Woodward, Mingo Jct., Ohio.

WE Pay Cash for Bostops, Labels, Wrappers, Coupons, Bottle Caps, etc.!! Particulars free. Bostops, PS-983-E Main, Columbus 5, Ohio.

\$\$\$ IN Personalized Baby Record Books. Sell By Mail Use Same Literature We Do. No-Co-Ro, Oakland 6-P, Calif.

HOW To Earn Up To \$500. for each Script, writing for Television. New, Different! Particulars Free! Wonderful Products, Box 2113-A, Santa Fe, N. M.

MEN-Women: If you are interested in addressing advertising literature for national firm, rush 3c stamp for further information. Advertisers Service, Box 4097-PS, San Diego 4, California.

\$35 WEEKLY addressing envelopes. Instructions \$1, refundable. Adservice, Spring Valley 36 New York.

10,000% PROFIT! Details free! Douglas Service, Box 675, Oak Terrace, Minn.

1930 DEPRESSION forced me to invent my own business—a minimum-cost, high-potential home mailorder. Lucky design paid immediately, over \$1,000 every month since! Over half net! This original design, "Selective Mailorder," is United States Postal Service approved. Now mapped out to guide mailorder operators. Literature free. Eveningshade Ranch, Helotes 15, Texas.

FREE. Complete mailorder business. Terrific profits. No investment. Vita-Mins, 2910-PS Beverly Blvd., Los Angeles 57.

ALUMINUM Awnings, baked enamel colors, factory prices, any size. Write All Weather Comfort, Box 10254, Tampa, Fla.

500% PROFIT in Plastic Laminating. Complete outfit including terrific Accumulation Salesplans \$1.00. Nothing else to buy. "Argon," Box 6346, Philadelphia 39.

39 FORMULAS, PLANS, ETC.

FORMULAS—All kinds. Latest products. Literature free. Kemico, Park Ridge 15, Ill.

500 MONEY Making Formulas. 25c Postpaid. Allen, Dept. PSC, Clinton, Missouri.

FREE Formula Catalog. Anything analyzed \$35.00. Western Chemical, Salem, Ore.

ANY Formula \$5.00. Satisfaction guaranteed. Jack, Chemist, 5138 Gainor, Philadelphia 31.

LATEST and best in modern manufacturing formulas since 1897. Literature free! Lescomb Miller, Chemist, Tampa, Fla.

REAL Manufacturing Formulas Lists Free. Cumming, Chemist, Gordon Avenue, Syracuse 4, New York.

LABORATORY Tested Formulas. Catalog free. Pont Chemical Company, Terre Haute 1, Indiana.

ANY Formula \$3.00. Catalog—Chemical Instruction sheet 10c. J. Belfort, 192 N. Clark, Rm. 620, Chicago 1.

40 PLASTICS

PLASTICS home-craft course for Men and Women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for Free booklet. Interstate Training Service, Dept. D2-A, Portland 13, Oregon.

NEW Liquid casting plastic. Clear, colors. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for Castolite Creations Manual and proved Success Plan showing how to make money at home. Castolite, Dept. A-102, Woodstock, Ill.

PLEXIGLAS Lucite. Any size sheets. Square foot (12x12) cost, 1/16", \$1.18; 1/8", \$1.55; 3/16", \$1.90; 1/4", \$2.25. Add 15% for postage. Minimum order \$3.00. Almac Plastics, 600 Broadway, New York City.

PLEXIGLAS sheets—cut to size—clear, all thicknesses—standard outdoor translucent colors. McClarin Plastics, P.O. Box 168B, Hanover, Pa.

LEARN Plastics at home. Complete kit—\$5.98 postpaid. Dime brings sample plastic, three experiments, full details. Plastic Projects, Box 5151, Detroit 35, Mich.

PLASTIC Sheets, Rods, Tubes; etc. Free List. Plastic Supply Co., 2901 N. Grand Blvd., St. Louis 7, Mo.

FIBERGLAS, Polyester, Plexiglas, Acetate, Vinylite; Casting, coating plastics; Maurice Lannon's Fiberglass "How" book now ready—\$2.50. Fast service, best prices. Catalog—10c. Airmailed—35c. Gem-O-Lite, Box 6868P, North Hollywood, Calif.

PLASTICS—Cements—Dyes—Findings—Carvings. Wholesale prices. 64 page catalog free. "Trace & Carve" pattern book for carving and coloring fish, birds, animals, only 35c. Taylor & Art, Inc., 1710 East 12th St., Oakland 6, California.

41 CHEMICALS & APPARATUS

NEW Idea Chemical and Apparatus Outfits for Home Experimenting Photo-Scales, Microscopes, Chemicals, Biological and Laboratory Supplies in Small Quantities. Catalog 25c. Established 1931. John H. Winn, 124-B West 23rd Street, New York, N. Y.

LUMINOUS Paints will glow in dark. Six colors. Fairmount Chemical Co., 136 Liberty St., New York City 6.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 20c. Tracey Laboratories, Evanston, Illinois.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1175 Mt. Hope Ave., Rochester 20, N. Y.

AMAZING New Book of Science. Experiments, Formulas and catalogue of Laboratory Supplies. Only 25c. National Scientific Co., Dept. 15, 2204 W. North Ave., Chicago 47, Illinois.

SPECTROSCOPE for quick chemical analysis \$3.00. Cutting Sons, Los Altos, California.

URANINITE—'The rock that lives'. Principal source of Uranium. Curio extraordinary! Certified specimen, beautifully mounted—\$2.00. Schools—Homes—Prospectors. Uraninite-Carnotite \$3.50. Join "Future Chemists of America." Member participation. Education. Profit. Fun. Particulars free. Parkway Laboratory, 1004-e Second Avenue, Pittsburgh 19, Pa.

COMPLETE Catalog. Bargain Lists 20c. Laboratory Sales, Box 161B, Brighton, Mass.

IF you have a lab, our paper is for you. For free copy write: The Amateur Chemist, Westwood, Lassen County, California.

42 HELP WANTED

FOREIGN Employment Construction Work. If interested in foreign projects with high pay, write Foreign Service Bureau, (Dept. P S.), Metuchen, New Jersey.

FOREIGN & Latin American Employment 1954 "Foreign Service Directory" gives Up-To-Minute Facts on Military & Civilian Construction, Government Jobs, Major Oil Listings, Aviation, Transportation, Steamship Lines, Mining, Importers, Exporters. How-When-Where to apply application forms. Hot List Firms Hiring. \$1.00 postpaid. Global Reports, Box 883-S, Hollywood 28, Calif.

ADDRESS advertising postcards. Must have good handwriting. Lindo, Watertown, Mass.

FOREIGN Job News and Domestic. Send \$1.00 for World Wide Construction Projects. How-When-Where to apply. Global Reports Monthly, Box 883-Sx, Hollywood 28, Calif.

ALASKA!! Last American Frontier. \$1.00 brings 1954 Business Directory & Government Map. Military & Civilian Construction; Homestead & Highway facts; Mining, Aviation, Fur Farming, Grazing, Timber, Travel directions. List of firms hiring. How to apply. Alaska Opportunist, Box 92-S, Hollywood 28, Calif.

JOBS on ships and yachts, excellent pay. Foreign Travel, Davenport's, Dept. 4, Box 1354, GPO, New York 1, N. Y.

SOUTHERN California is booming! If you are interested in learning about job openings, Business Opportunities, actual companies now hiring, pay scales, living conditions, etc., in this fabulous area, write Tower Distributors, Dept. 303, 15136 Vermont, Paramount, Calif.

HELP wanted in healthful wealthy San Joaquin Valley. Current job listings airmailed. \$1.00. Riedinger's, 1101 Vagedes, Fresno, California.

H.S. Graduates, mechanically inclined, for college-level training. Good pay, rapid advancement. Write Prof. Latzer, 930 Carteret Avenue, Trenton, New Jersey.

MEN Earn \$1,500.00 per month on Foreign projects. Men Wanted now on Foreign, Latin America and Far North projects. Truck Drivers, \$3.55 hour. Clerks, \$3.00 hour. Electricians, \$4.00 hour. Carpenters, \$3.70 hour. Laborers, \$3.00 hour. Most all trades wanted. Up to 70 hour week with time and one half for all over 40 hours. Transportation paid. 8 to 24 month contract. New treaty with Spain. South Korea will start new bases at once. Get in on start. Full information of over 20 sheets 9 1/2 x 11 listing over 200 firms now hiring, conditions, wages, hours, contract requirements, application form, etc.; also latest issue of our monthly Bulletin listing new contracts and coupon worth \$1.00 on subscription. All for \$1.00. Airmail \$1.24. Edward O. Burns, 911 N. Lancaster Avenue, Department 30, Dallas, Texas.

CALIFORNIA needs men. Aircraft, factory, etc. Skilled, unskilled. Also Foreign jobs. Both lists \$2.00. Personal Service, 1708F Gardena Blvd., Gardena, Calif.

SEATTLE, Tacoma, Portland, Job Lists. Housing information \$1.00. Nelsons, 1615 Riverview, The Dalles, Oregon.

JOB Opportunities Overseas! Some paying skilled \$340 weekly, drivers \$275, laborers \$255. Transportation, overtime. 23 firms seeking applications from construction men, clerks, etc. Plus 269 projects underway in 53 countries. 44 page manual, application forms everything, \$1. Job-service D-1, Box 30, Billings, Montana.

HONOLULU Help Wanted columns airmailed \$1.00. Pomeroy's, #3 Campbell Block, Honolulu, Hawaii.

CALIFORNIA Jobs. California's population increasing over 400,000 a year—become part of it. Have a job waiting your arrival. Complete listings, information, \$1.00. Satisfaction guaranteed. Midcentury, Box 11461, Los Angeles 48, California.

\$1300 MONTHLY for truck drivers. \$1400.00 monthly for carpenters, electricians, plumbers, mechanics. \$1200.00 for clerks and laborers. Replacement hiring now being done. Full information and complete foreign listings, with current information on Spain job. \$1.00. Women's listings. \$1.00. 25,000 men and women needed for new stateside project! Complete information and other domestic listings. \$1.00. Dept. 4-A. Opportunities Unlimited. 1110 Commerce Bldg., St. Paul, Minn.

GOLDEN California—Men needed. Thousands of openings. Jobs to \$5,000.00 per year. \$8,000.00 per year skilled. Act Now! Send \$1.00; California Job Opportunities. Box 870-J. Los Angeles 53, California.

SOUTHERN California jobs, housing information. \$1.00. Elliott, Box 11642, Los Angeles 47, Calif.

EMPLOYMENT SERVICES

FOREIGN Jobs. Contracts underway and soon starting in Africa, South America, Canada, England, Europe, South Pacific, Middle East, Mexico and Alaska. Send \$1.00 for foreign job news, information, application forms, etc. DCS Foreign Job News, Dept. 268-NZ, Bridgeport, Ill.

OVERSEAS Jobs. Big pay, transportation expenses. Clerical, professional, mechanical workers. Most all trades. Latest listings, airline, construction, manufacturing, oil, steamship companies, government agencies, many other opportunities. Up to date information on securing employment, contracts, income tax, application forms. \$1.00. Overseas Jobs, Box 335-B17, Baton Rouge, La.

CONSTRUCTION Job List Published Monthly. \$1.00. Dempster's Construction Scout News, Dept. 268-NY, Bridgeport, Ill.

43 AGENTS WANTED

AGENTS—Distributors, Canvassers—Promoters—"The Wonder Tool" now being advertised very extensively on television and newspapers. Sharpens knives, scissors, lawnmowers, etc. Cuts glass. Your price, send \$1.00 for two samples. We pay postage. Dozen \$5.00. Gross \$48.00. Cash. Balance C.O.D. Telegraphed orders will be air expressed or airmailed. Albert Cahill Steel & Iron Works, Adams Avenue, Toms River, New Jersey.

NEW Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 28 E. Jackson, Dept. 18, Chicago 4, Illinois.

AGENTS—300% profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 431-E North Clark, Chicago.

ABSOLUTELY Free—Sales Kit. Yours for the asking. Send postcard today requesting kit showing new line, belt buckles with your name or personal initials, cap badges, choice 3000 different emblems. Write Hook-Fast, Box 1425PS, Providence, R. I.

START Your Own Business on credit. Your own boss. 1658 of our Dealers sold \$5,000 to \$27,500 in 1953. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant, profitable business backed by world-wide industry. Write Rawleighs, Dept. A-U-PSC, Freeport, Ill.

BIG Money making opportunity. Exclusive line work uniforms, jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit Free. Master Div., Dept. 156, Ligonier, Indiana.

MAN to earn \$150 and up per week. Long needed invention. Advertised worldwide. Prospects are everywhere. Full or part time. Exclusive. No investment. Free samples. Write Red Comet, Inc., Dept. 342-H, Littleton, Colorado.

STRANGE "Dry" Window Cleaner. Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee 51, Akron, Ohio.

BUY Wholesale—25,000 items—Catalog 25c. Matthews, 1472-A4 Broadway, New York City 36.

ADDRESS advertising postcards. Must have good handwriting. Lindo, Watertown, Mass.

GOLD or Silver letters, numbers. Windows, Doors, Trucks, 1" to 6". 500% Profits—Free Samples. Atlas, 544-U West 79th, Chicago 20.

IS \$210 a week worth a postcard to you? Then rush card with name and address for special Free Trial Plan that sells amazing new Automatic Refrigerator Defroster "like hot cakes!" Write to Mr. Lewis, D-Frost-O-Matic Corp., Dept. K-103, 173 W. Madison, Chicago 3, Ill.

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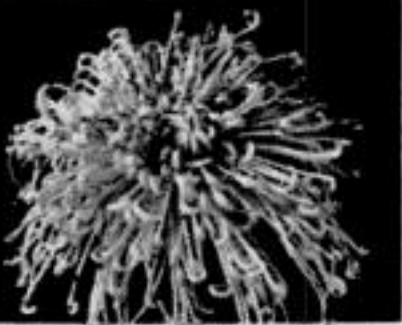
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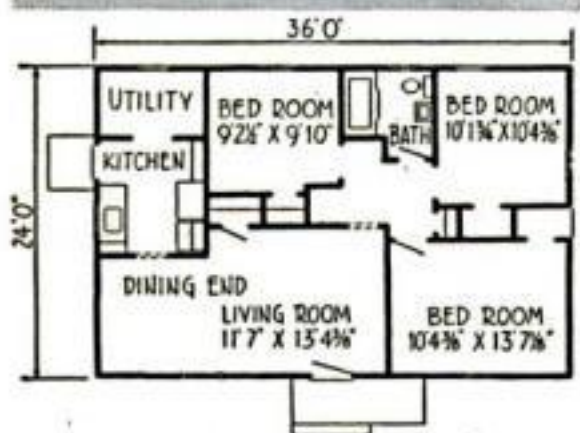
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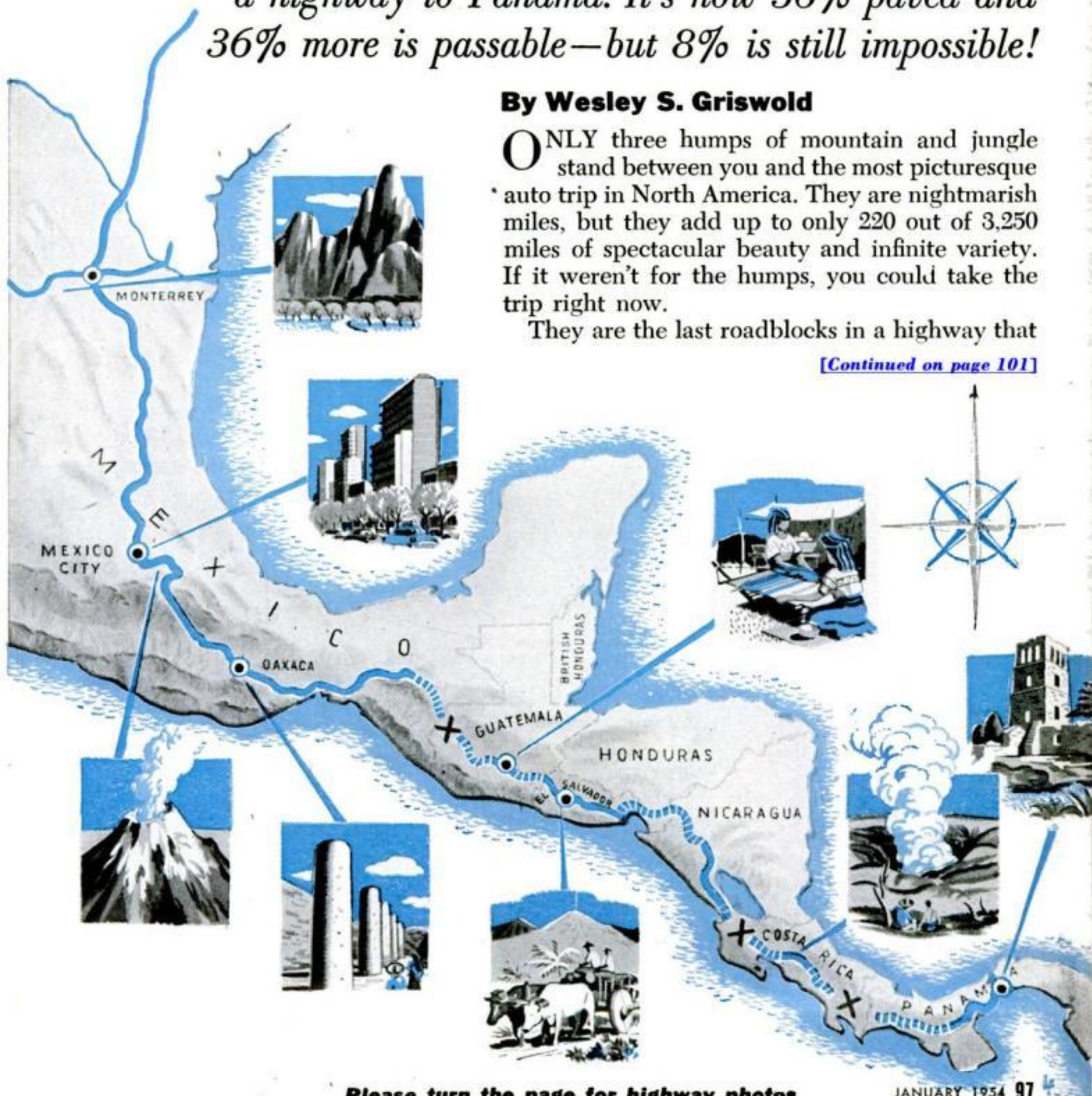
Since 1934, the U. S. has put \$51,000,000 into building a highway to Panama. It's now 56% paved and 36% more is passable—but 8% is still impossible!

By Wesley S. Griswold

ONLY three humps of mountain and jungle stand between you and the most picturesque auto trip in North America. They are nightmarish miles, but they add up to only 220 out of 3,250 miles of spectacular beauty and infinite variety. If it weren't for the humps, you could take the trip right now.

They are the last roadblocks in a highway that

[Continued on page 101]



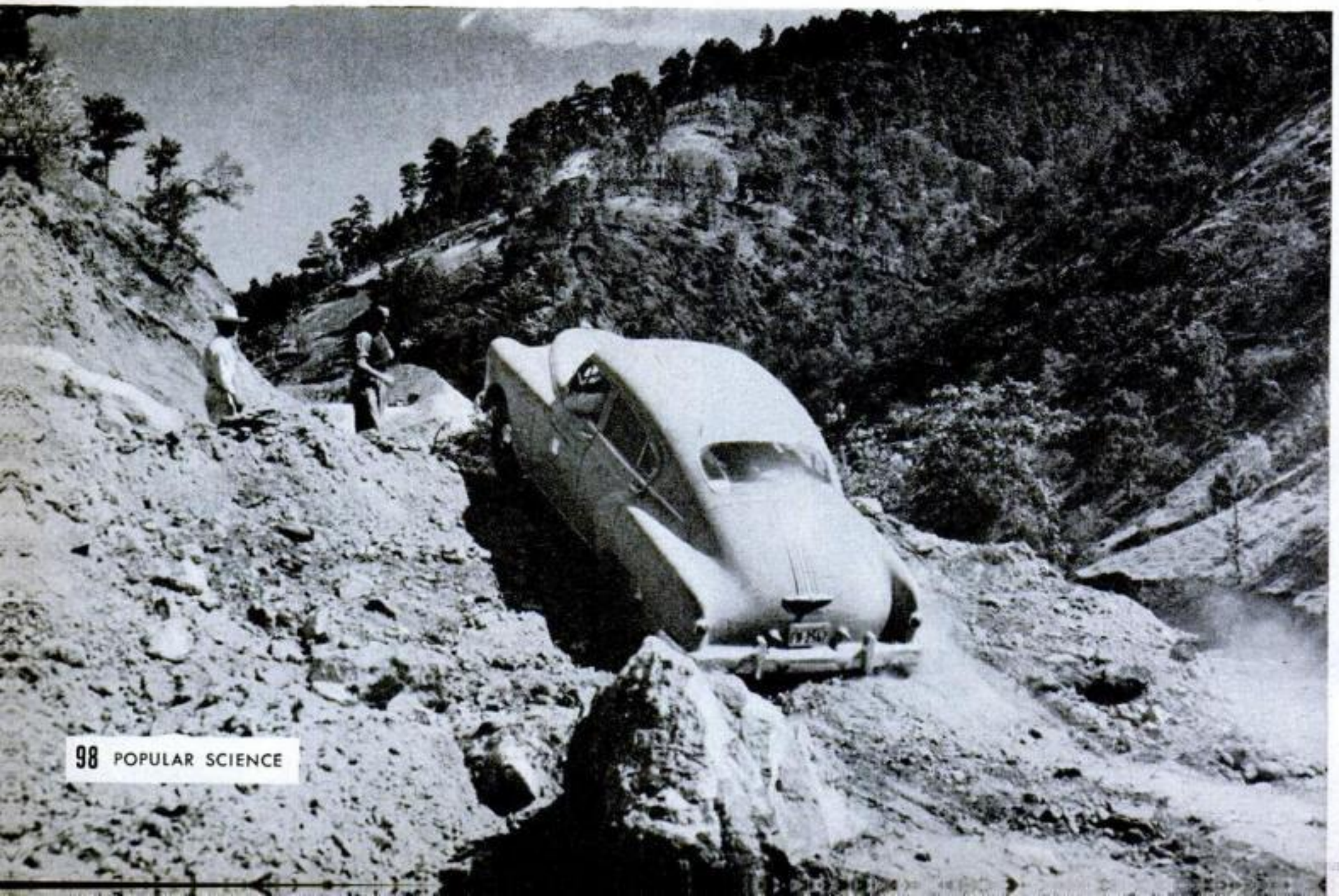
Please turn the page for highway photos.

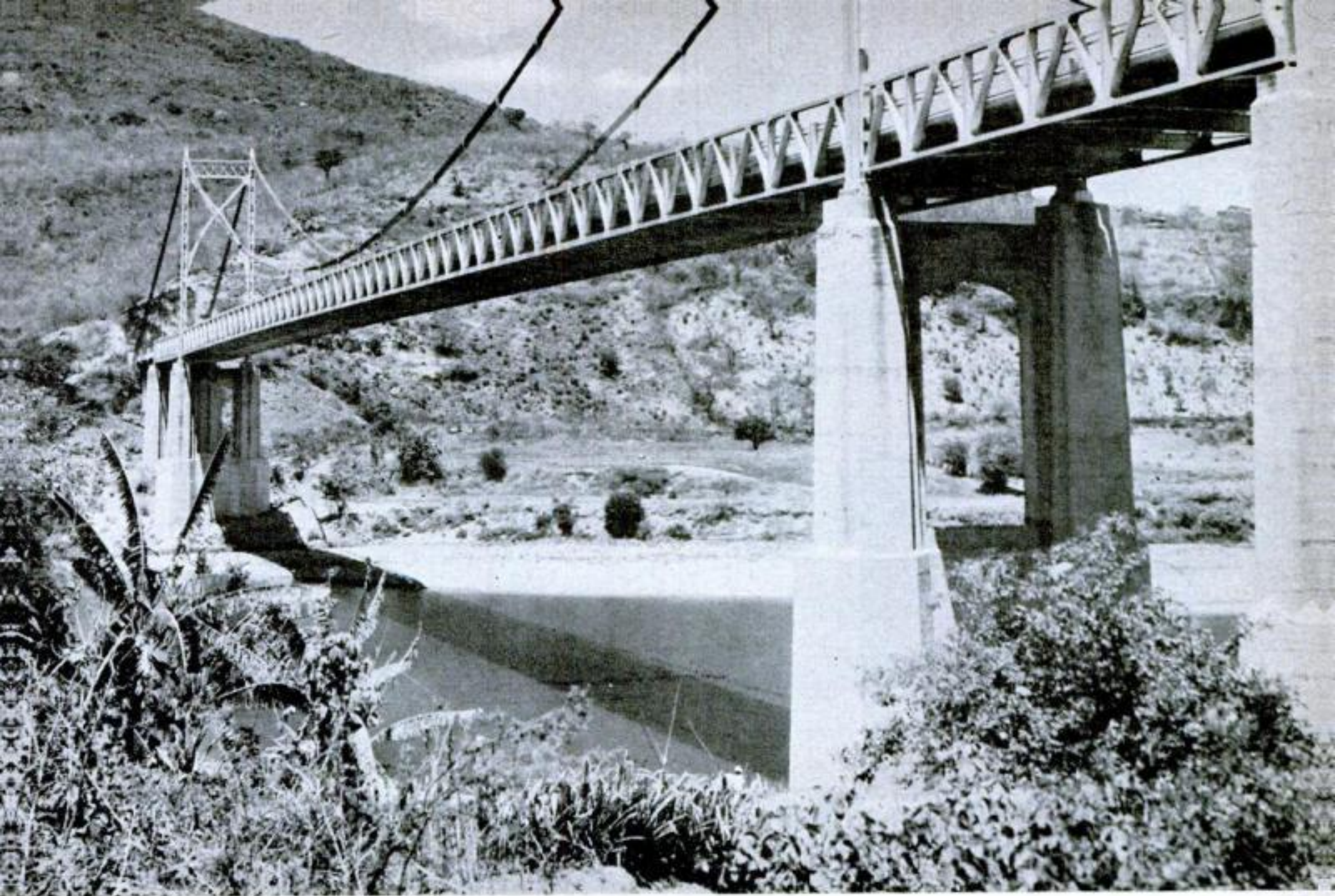
JANUARY 1954 97



**After a soaring start,
it lands in a ditch**

Mexico (above) has proudly built 1,600 miles of the Inter-American Highway without U. S. help. But the road quickly becomes impassable when it reaches Guatemala (below).





***Beyond a majestic span,
there's no bridge at all***

After smoothly crossing most of Guatemala and all of El Salvador (above), Honduras and Nicaragua, the road again bogs down (below) and runs out where it enters Costa Rica.





**After a leap above clouds,
it peters out in the bush**

In central Costa Rica (above), the road provides magnificent views. But suddenly it plunges into wild country (below) and ends, 130 rugged miles short of the Panama line.





All photos from U. S. Bureau of Public Roads

Beyond a snarl of jungle lies an alluring goal

for 20 years has been inching its way down the long curve of continent between the U. S. and Panama.

It's a road that slices a cross section of the ages. It provides glimpses of the remains of ancient civilizations and occasionally of people whose ways remain as primitive as those of the Indians who peered from dark forests at the debarking Pilgrims.

It's a road that crosses noble mountain ranges, leads through one of the most modern-looking cities in the world, divides fragrant groves of orange trees, dips towards the sea down vivid slopes of red and green rocks, winds past smoking volcanoes, skirts lakes of incredible blue, and plantations of cotton, coffee, bananas.

At the end of this alluring international highway lies the Panama Canal, a road for those who "plow the paths of the seas."

You have invested \$51,000,000 during these last 20 years to push that highway to the edge of the Canal. The people of Mexico, Guatemala, El Salvador, Hondu-

Under a canopy of royal palms, the road enters Panama City, 3,250 miles from Laredo, Tex. But three formidable gaps still block your path to this charming destination.

ras, Nicaragua, Costa Rica and Panama have invested millions more.

Fifty-six percent of the 3,250-mile road is *paved*. Thirty-six percent more is comfortably passable. But eight percent is impossible!

After all this time and money, there are still three gaps in the highway, thwarting the hopes of eight nations and damming the flood of automobile tourists who are waiting to enjoy and help enrich the lands along the way.

Road Would Attract Thousands from U.S.

Even people who have no desire to see those exotic countries between here and Panama must appreciate that if the route through them were clear, it would divert thousands of cars that now crowd the roads leading to the scenic beauties of the U. S.

The gaps in the Inter-American Highway would not be so serious if they seemed to be temporary.

One of them, fortunately, won't be in your way for long. A 50-mile length of road still remains to be built in northern

Famed Highway Planner Backs Road to Panama



FOR a number of years I have been extremely interested in the Pan-American Highway and have urged that it be progressed at an accelerated rate. The Federal Government should take a livelier interest in this project—that is, in finishing the main Central American route without further delay.—ROBERT MOSES

New York City Construction Coordinator and Chairman, Triborough Bridge and Tunnel Authority

Costa Rica to hook up with Nicaragua's completed portion of the international highway. But U. S.-Costa Rica funds are available for the job, road crews are hard at work, and the gap is expected to be closed by the end of 1954 or early in 1955.

It won't do you much good, however, as long as you can't drive from Mexico into Guatemala or from Costa Rica into Panama.

Right now, those two gaps are beginning to look as permanent as Gibraltar.

The first one is a 25-mile stretch in northern Guatemala. The proposed route through here follows the windings of the precipitous Selegua Canyon. The canyon is deep, but the marsh of international politics into which hopes for the road have sunk at this point is far deeper. Until the political bog is drained, the only way to ride through the Selegua Canyon will continue to be by bicycle or mule.

The only way to get by automobile from the Mexican end of the 25-mile gap to the Guatemalan end is to take a 500-mile detour, including half a day's ride on a Mexican freight car!

The second apparently unbridgeable gap on the highway route to Panama is a much broader one. It is a 130-mile road barrier of formidable dimensions, in southern Costa Rica.

At the edge of the gap, the Continental Divide squeezes against the Pacific shore, and the route crosses it at 10,932 feet above sea level. On a clear day, you can see both oceans from the pass, though each is more than 100 miles away.

[Continued on page 256]

International Business Leader Says Panama Road Would Be Great Boon



The Inter-American Highway is one of the great unfinished jobs of the New World. It should be pushed forward to completion at an early date, especially because only three small gaps remain.

As I view projects of this character, they are of tremendous value in promoting understanding between peoples. After all, there is no substitute for travel as a medium of broadening our knowledge of other peoples. When nations have as much in

common as do the people of the two Americas, it is tragic that they should not be able to get better acquainted than they are.

No medium that I know of lends itself better to such associations than does the road. Over it, the traveler can move at will, stopping as he wishes. He can chat with others,

observe their way of living, even perhaps become a resident or an investor.

The road does much more, as we in the United States have good reason to know. Through its improvement, the farmer finds his market place while his family is able to share all the benefits of community life.

New areas of productivity, so many and so diverse in the Latin countries, can be opened to commerce, and out of that the whole way of living is lifted. New and solid values are created. Mexico is a pointed example.

From the standpoint of those of us who live in this country, the road will give us new opportunities for trade as well as for tourism, but the first gain is to those in whose countries the road is found.

As a means of building relations between people with a common desire for freedom, I see the Inter-American road as a great Highway of Friendship.

Its dedication to the services of the Americas should be set for an early date.

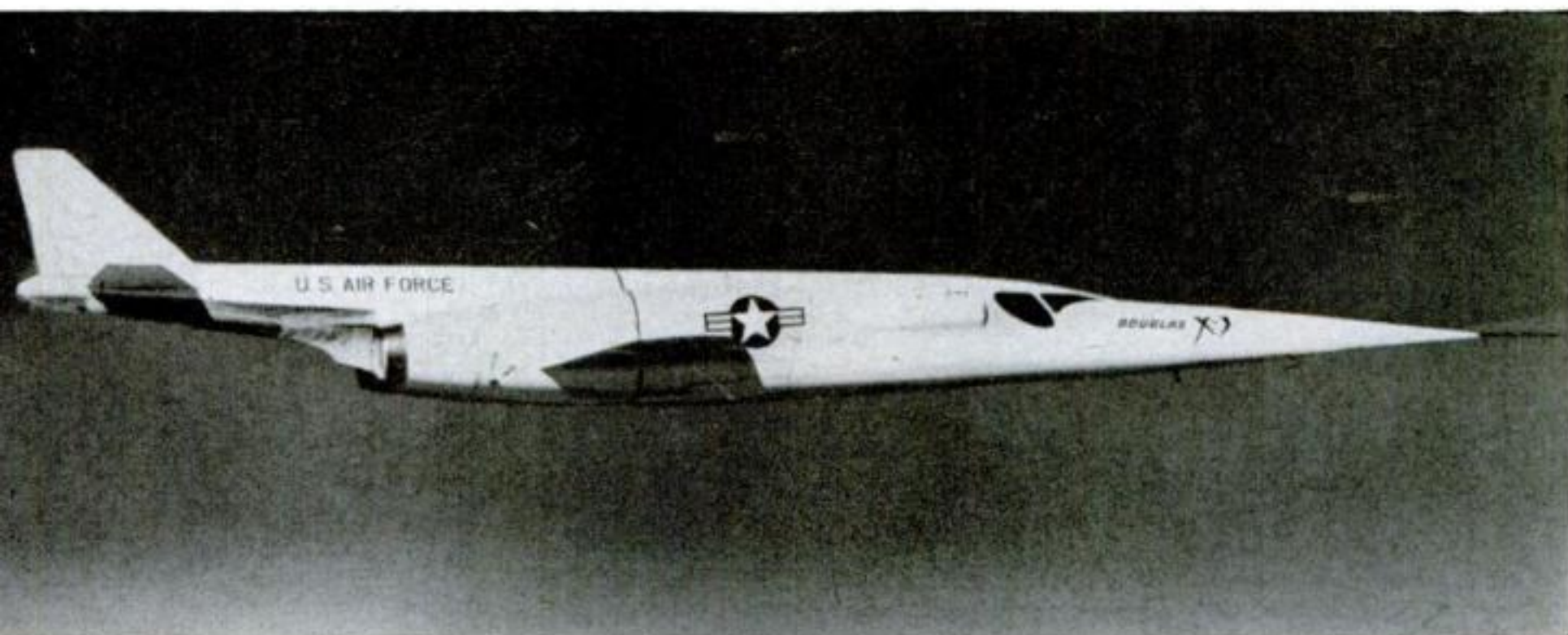
—PAUL G. HOFFMAN
Chairman of the Board of Studebaker Corp. and former head of ECA and Ford Foundation.



Flying Nose Designed for 2,000 M.P.H.

SPEEDS of 2,000 miles an hour at very high altitudes is the mission of the Douglas X-3, latest of the weird-looking research planes that are seeking the answer to the mysteries of supersonic flight. Jet-propelled, the stiletto-shaped plane is more than 66

feet long, but its rear-placed wing has a span of only about 22 feet. During its Air Force test flights, the X-3 was packed with 1,200 pounds of research instruments to record information for use in designing future faster combat planes.



They Test Cooking

*Using a small bottle that acts almost human,
Government chemists save time, money and animals
in finding out the health value of what you eat.*

By Herbert Yahraes

AT BELTSVILLE, MD., just off Route 1, north of Washington, D.C., chemists are putting foods through a glass stomach to determine what's good for our own.

The glass stomach is only a bottle. But the chemists—working for the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture—have learned to make it act like a real stomach in breaking down protein.

That is important because it leads to a quick procedure—using test bugs called lactobacilli—for determining the quality of protein. And this, in turn, is important because it leads to ways for conserving this foodstuff and for finding new sources. Protein is so basic to life that a Dutch chemist 115 years ago appropriately named it from the Greek word meaning “first,” yet most of the world has too little of it.



WHAT HAPPENS TO RATS can happen to us if we get too few proteins. For 100 days these two were fed equal weights of food; the bottom one simply ate meals poor in proteins.

Maybe you've thought protein was protein, except that in steak it tasted somewhat better than in beans. That's wrong. Beltsville scientists some years ago fed two groups of rats a diet that was exactly the same except that one group got its protein from peanuts and the other from lentils. After three months, the first rats were sleek and healthy; the others, scrawny and sick.

Building Blocks Missing

Why? Because the protein in lentils contains very little cystine and methionine—two of the 22 building blocks from which protein is made. These building blocks are called amino acids.

When you eat protein, your body breaks it down into the separate blocks and then uses these to make its own protein compounds—which vary widely, depending on whether they go into muscle, gamma globulin, an enzyme, or some other structure vital to your existence.

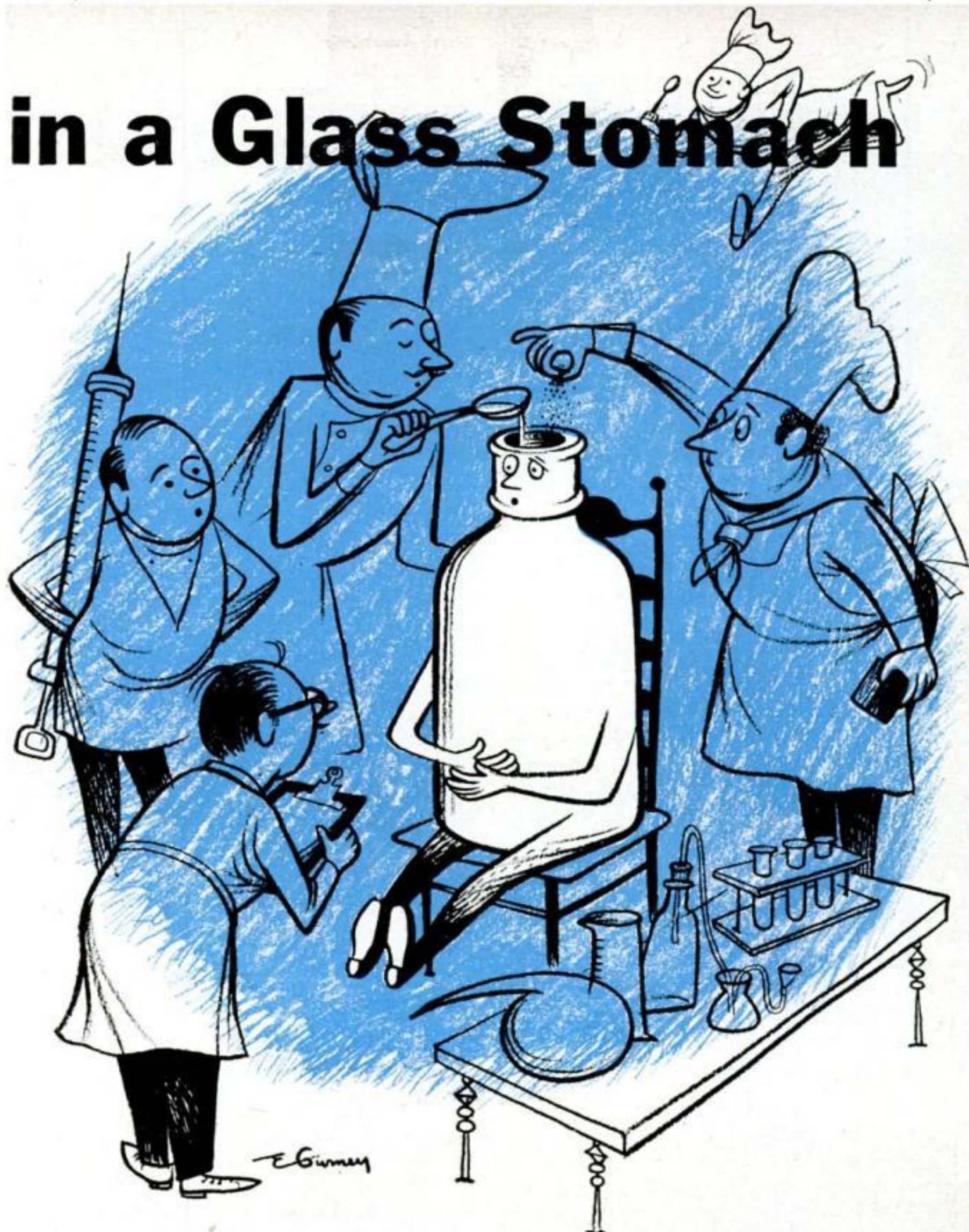
The body can manufacture a dozen or so of the building blocks itself, but it has to get the others by breaking down the proteins you eat. These others are known as the *essential* amino acids; if they aren't in your diet in sufficient quantity, something goes wrong.

Glass Stomach Speeds Analysis

That's where the glass stomach comes in, for it provides a quick method of determining a food's amino-acid content. It works like this:

The chemists, who are led by Dr. Millard J. Horn, grind about a spoonful of the food to be tested and drop it into a

in a Glass Stomach



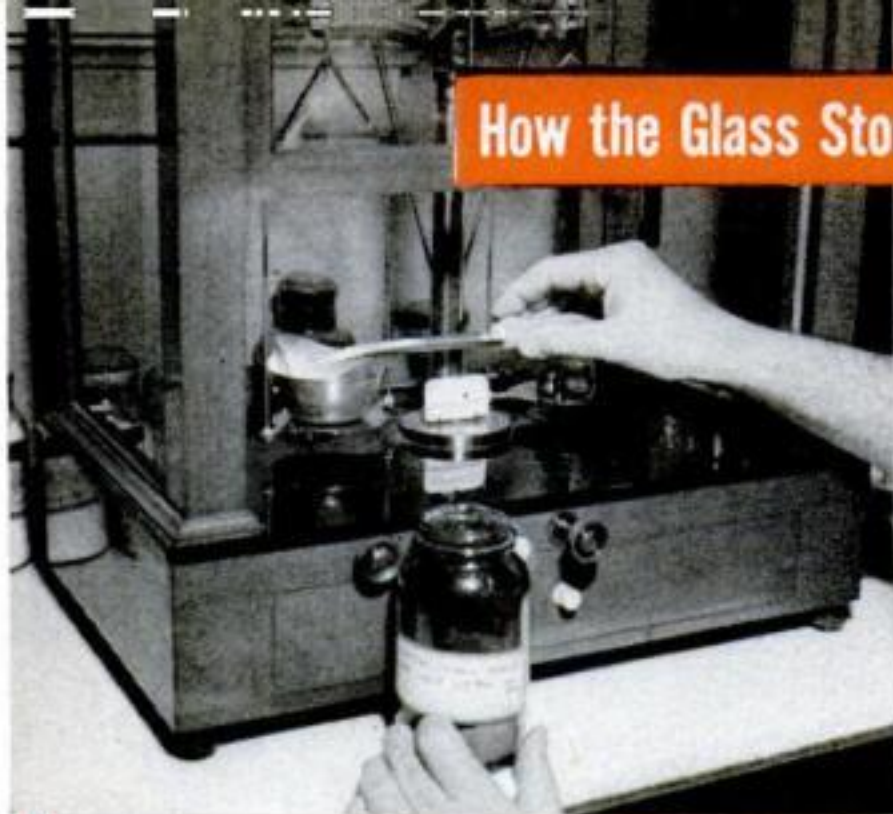
four-ounce bottle. They add the two main digestive agents found in the human stomach. Then they take the bottle to the hot room. This is kept at body temperature—98.6 degrees—by thermostatically controlled electric heaters.

Here they clamp the bottle to a tumbling machine, a motor-driven cylinder fitted with a wooden sleeve holding 24 bottles, and this apparatus gently turns

it over and over, end to end, in a process resembling the churning of the human stomach.

Next day the chemists add just enough sodium phosphate to alkalize the contents and thus match the conditions of partly digested food in the human being as it passes from the stomach into the intestine. Then they sprinkle in some trypsin, the main enzyme found in the

How the Glass Stomach Tests a Meal



1 A BOTTLE'S DINNER—a spoonful of nourishing cottonseed meal in this case—is first ground fine and weighed. Test will tell how much of 10 essential amino acids it contained.

intestine, and let the bottle tumble in the hot room for another 24 hours.

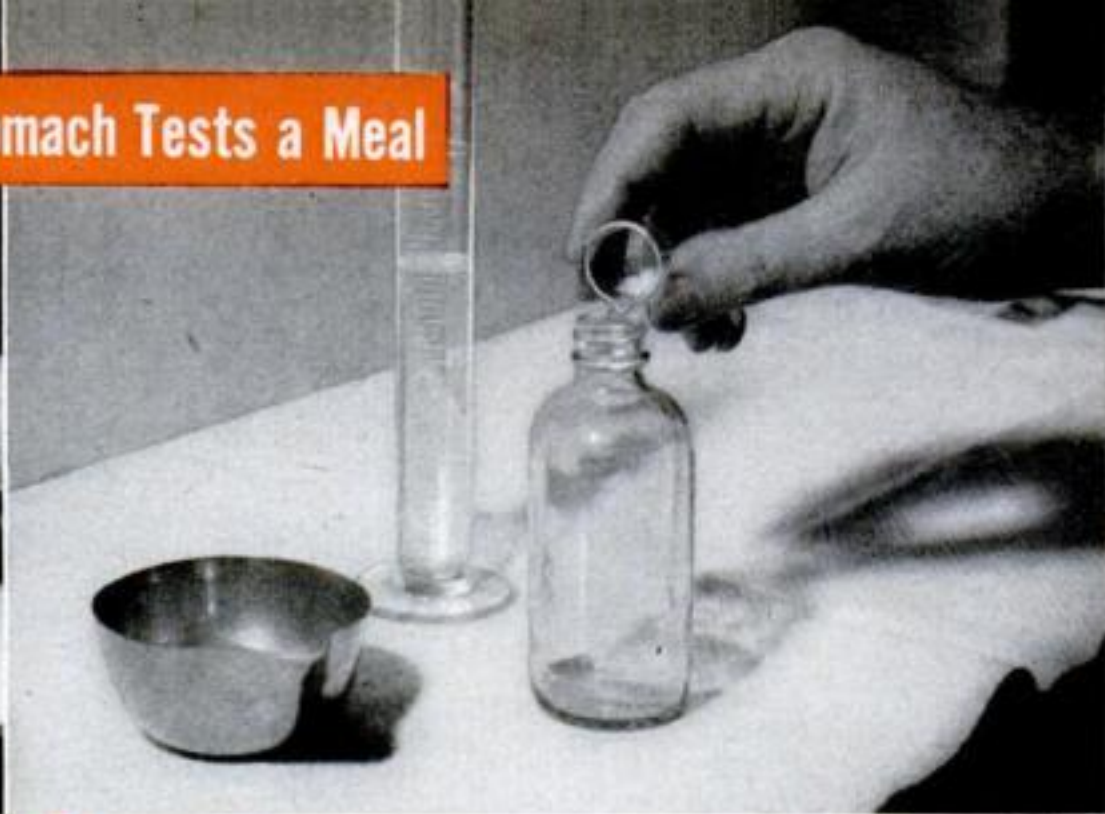
On the third day they add a dash of powdered hog mucosa, or intestinal lining. Like the lining of the human intestine, this contains a dozen or more enzymes. In another 24 hours of tumbling, the amino acids are as free from their linkages with one another and with other materials as they can be gotten in a natural digestive process.

Bugs Need Same Amino Acids as Man

The food as digested by the glass stomach is now ready for the test bugs. These are lactobacilli—micro-organisms that produce lactic acid. They are found in cheese, milk, silage and soil. Providentially, the lactobacilli require the same amino acids as man, and they have to have them in the free state; they can't break down proteins to get them.

The digested food sample is diluted with water to bring it to a standard volume, about a pint, so that samples taken from it can be precisely the same size as those from other glass stomachs. Then the samples are placed in test tubes along with the sugar, salts, and vitamins the lactobacilli need. Finally, a hypodermic needle is used to drop in the organisms. Each test tube gets one drop, and each drop contains half a million organisms.

For three days an incubator keeps the tubes at about 95 degrees, which is the temperature the lactobacilli like best.



2 AT FEEDING TIME, start of the test, a bottle gets its ground food, plus a dash of pepsin and weak hydrochloric acid, and its mouth is shut with a rubber-lined cap.

How well the organisms grow depends upon how well their needs for amino acids are met by the food from the glass stomach. If the needs are well met, the bacteria produce so much lactic acid that it makes the solution cloudy.

But the scientists don't depend on appearances. By a process called titration, they precisely measure the lactic acid.

Maybe the test sounds like a lot of work, and certainly months of thinking and of trial-and-error experiments were required to set it up and prove it. "But," Dr. Horn points out, "with the glass stomach we can determine the protein value of food in six days, and we can run 24 foods at a time. What we can now do in a week would take a year with animals." He might have added that washing bottles is simpler than cleaning rat cages.

First Test—Cottonseed Meal

The glass stomach's first job has been to digest cottonseed meal—dozens of samples of it. Cottonseed meal is a pretty good protein: not as good as soybean meal but much better than wheat flour.

Cottonseed meal is now widely used as feed, but the meal from one processing plant may be considerably more nutritious than from another.

The glass stomach told why. In extracting the oil, some plants cook the seeds at higher temperatures or for longer periods than other plants. Placed in the



3 DIGESTION OCCURS, in a room at body heat, when a tumbling machine gives test bottles a gentle churning like that of a real stomach. Then intestinal enzymes are added.



4 AFTER A MEASURED DRINK of water, 72 hours beyond the test's start, digested material from bottles is poured into test tubes and given a dose of sugar, salts and vitamins.

glass stomach, the meal from these factories released a smaller quantity of amino acids.

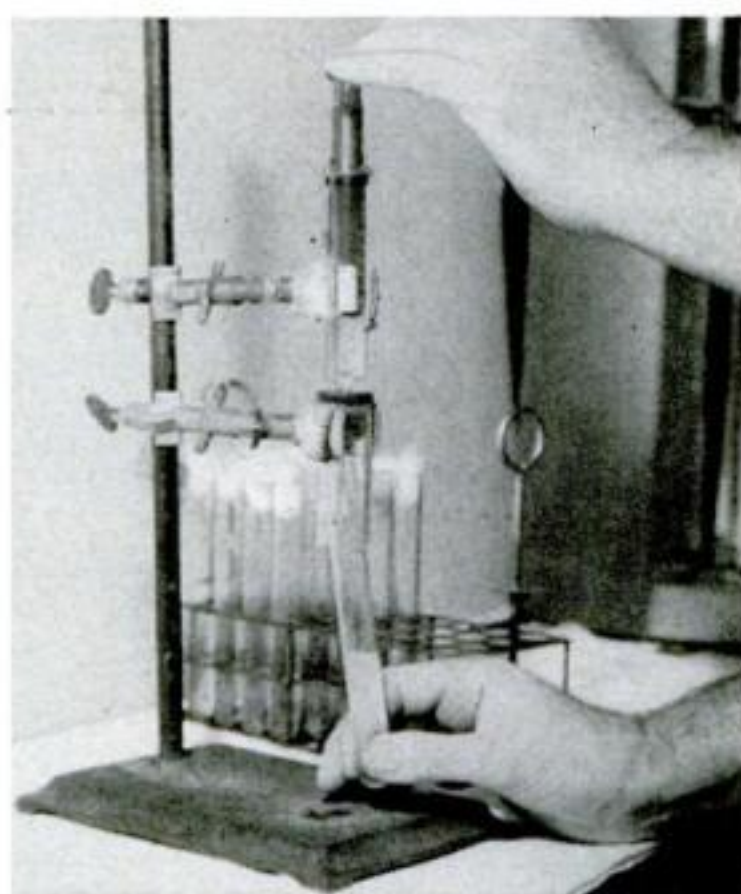
Along with continuing tests on cottonseed meals, Dr. Horn's group recently began putting other protein-containing foods through the glass stomach. The findings aren't complete, but here are two general ones your favorite cook might like to know about:

- You can't do much damage to animal proteins—meat, eggs, cheese—unless you actually burn them. A piece of roast beef well done is just as rich in the essential amino acids as a slice of medium or rare.
- But you *can* hurt vegetable proteins. Cooking may cut their nutritive value by from 30 to 50 percent. The higher the temperature at which you cook a vegetable and the longer you cook it, the lower its protein value drops. These findings stem from tests on various kinds of peas and beans, and on corn, wheat, oats, rice and barley.

Explanation for Lowered Protein

Why does heat lower the protein value of lima beans, for example, and not of pork? Perhaps, the Beltsville group answers, because vegetables contain carbohydrates—sugar and starch—and in the heating process some of the amino acids become so entangled with these that the stomach, whether glass or animal, cannot free them for use.

[\[Continued on page 258\]](#)



5 500,000 BACTERIA—in a single drop from a hypodermic needle—next are put in each test tube. These bacteria—lactobacilli—happen to require the same amino acids as man.



6 IF BACTERIA ARE WELL FED, they produce enough lactic acid to make the test tubes cloudy. The measure of the lactic acid is the measure of the meal's nutritive value.



Six spectators crossing the road at a blind curve were killed when this Ford struck them.

Death and Daring Win Mexico's Killer Race

Glory won by Lincoln, Lancia, Porsche and Chevrolet is dimmed by carnage.

THE bloodiest, fastest and quite possibly the last Pan-American road race ended with broken records and enough broken bodies to horrify all Mexico and the entire racing world.

If there is never another Pan-American road race, however, even the greediest

SECOND-TIME WINNER in the big stock-car class, Lincoln repeated its impressive performance in last year's race. Four Lincolns flashed over the finish line at Juarez in 1-2-3-4 order. Reporters here are gathered around lead car, driven by Chuck Stevenson, who also led the field to victory in 1952. Lincolns in the race were 1953 models with 205-hp. engines and single four-barrel carburetors, which allowed engines to wind up to 4,600 r.p.m.



BARRELING ALONG in the high mountains between Puebla and Mexico City, Juan Manuel Fangio of Argentina whirls his winning Lancia around a tight curve. Lancias placed 1-2-3 in the big sports-car class, being trailed by a Ferrari, a Talbot, two more Ferraris and a Jaguar. Fangio's total time for the 1,912-mile run was 18 hours, 11 minutes. He didn't win any single lap but his steady pace brought him in ahead of flashier performers.



OUT IN FRONT of the light stock-car class, this Chevrolet, driven by 54-year-old C. D. Evans of El Paso, led two Fords, another Chevrolet and a Hudson across the finish line. Evans' total time was 24 hours, 48 minutes, but he claimed top speeds of 90-92 m.p.h. Evans had added only heavier shocks and an extra exhaust pipe. Casualties were heavy in the light sports-car class, in which a Porsche won. Twenty cars started; only two finished.





TEAMWORK PAID OFF for Lincoln. Four of the company's entries are here getting an engine check and a quick overhaul at Oaxaca, at the end of the 329.3-mile first lap of the race.



LUSH TREATMENT FOR LANCIAS included cartage to the start of the race in this enormous mobile garage. It contained a machine shop and dormitory and followed the racers.

fan can scarcely complain that the records set in this one could be bettered.

A Lincoln, at an average speed of 93.2 m.p.h., and a Lancia, at a dazzling average of 105.1 m.p.h. for the snaky, 1,912-mile course that runs from sea level to 10,000-foot summits and down again, copped first places and top purses in the big stock- and sports-car classes. A Chevrolet, at an average 77.1 m.p.h., and a Porsche, at 80.1 m.p.h., tore off with the light stock- and sports-car honors.

Even though his Ferrari came in sixth among the big sports cars, Italy's Humberto Maglioli hurled it over the final lap of 222.5 miles at one of the most blistering average paces ever recorded in a road race—138.4 m.p.h.

But "racing and sports cars can go just so fast, and Mexico's rugged mountain

highways will allow just so much speed," said one apprehensive commentator, expressing the gloomy thoughts of many. "Beyond those limits, the Pan-American road race will simply become suicide."

Lethal enough already, the 1953 race took a shocking toll of nine lives. At least a dozen cars were wrecked and dozens more were driven to death. Only 66 out of the 177 cars of all classes that began the race managed to finish it.

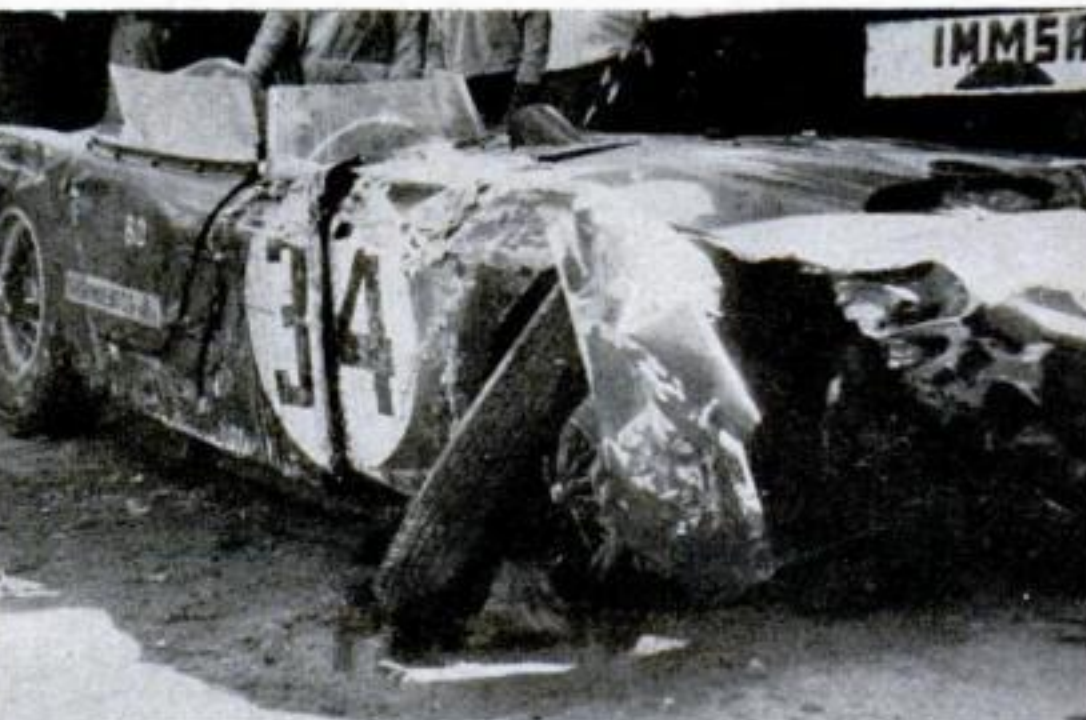
One driver unconsciously predicted his doom to the Mexican nation, following every mile of the race by radio.

"I'm going to fight this race to the death," shouted famed Felice Bonetto of Italy into a mike at Mexico City.

A few miles beyond, his flashing Lancia skidded into a concrete telephone pole and Bonetto's race ended as foretold. **END**



TWO LIVED TO DRIVE AGAIN, though their Oldsmobile entry was thoroughly demolished. They flew off the road into a ravine near Oaxaca, but escaped with mere scratches.



ONE MET DEATH when this Lancia skidded into a telephone pole. Felice Bonetto, one of Italy's most famous drivers, was at wheel and winning the race when crash occurred.



High-Tailing Cameras Record Air Flow Over Bomber Wing

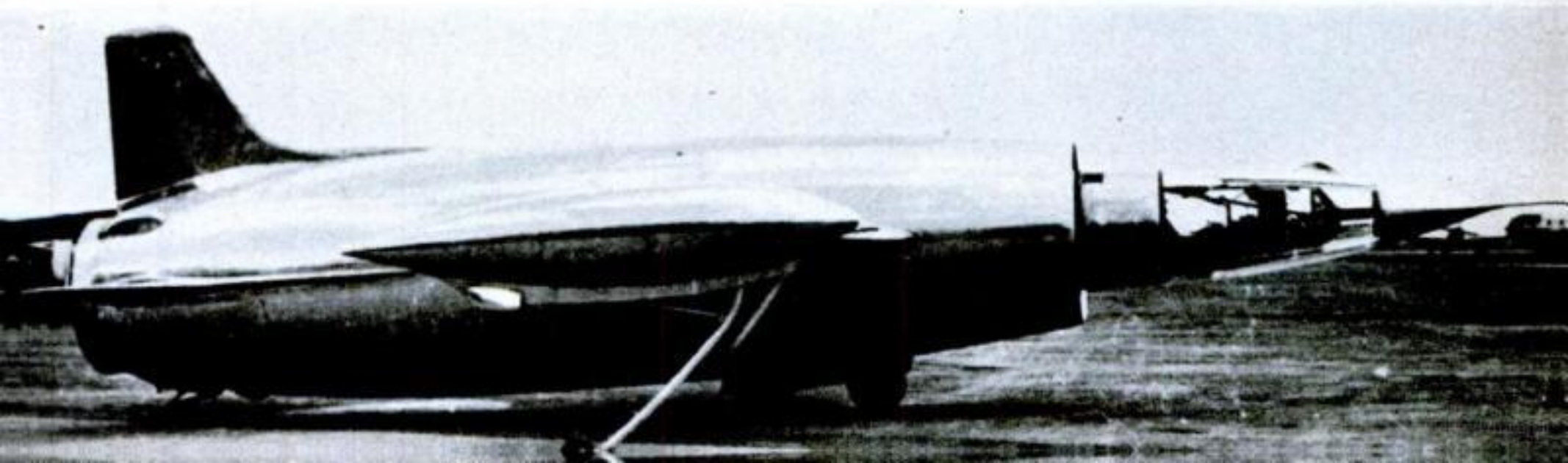
IT TOOK a lot of scaffolding to mount that pod high on the tail of the Stratofortress above. But when the plane took off (right), a pair of movie cameras inside the pod filmed the in-flight action of hundreds of tiny nylon tufts glued to the left wing. Boeing aerodynamicists found the B-52 wing behaved just as early wind-tunnel tests with models showed it would.

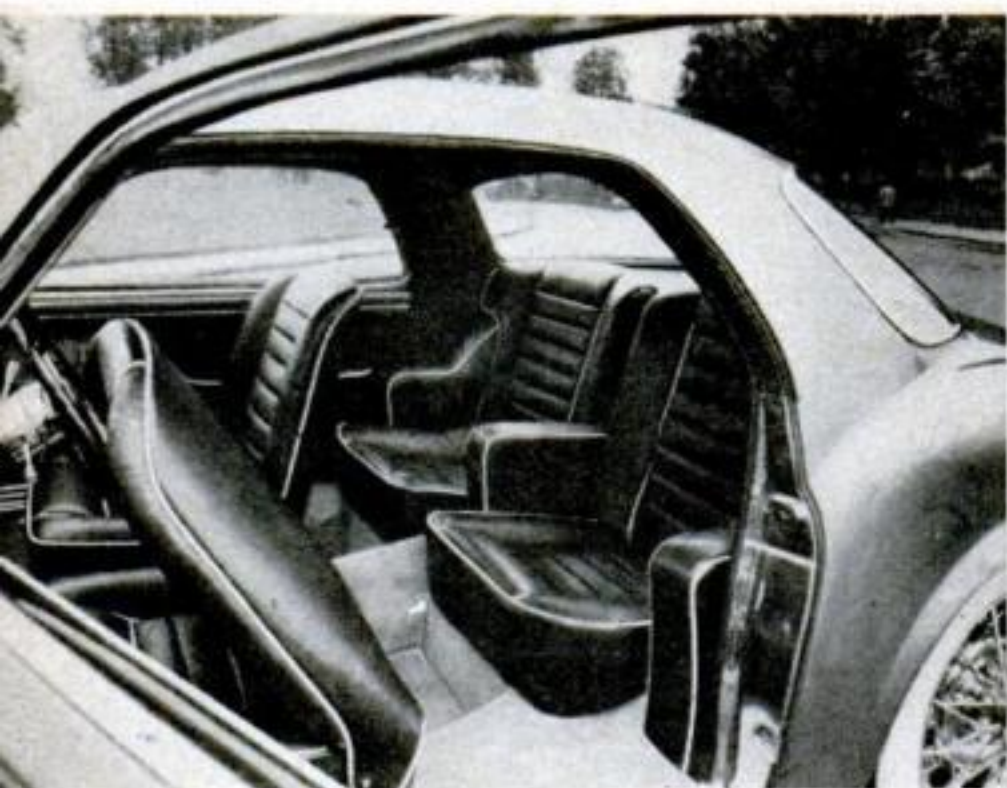


Pilot of French "Flying Funnel" Rides Way Out Front

A JETTISONABLE cockpit ahead of the air intake and retractable outrigger wheels mark the latest version of the Leduc 021, a

French ramjet. It has straight wings with fuel tanks at the tips and is designed for near-sonic speed in level flight.





Dream De Soto Blends Sport Look with Comfort

AS A happy means of road-testing some new theories of design and attracting a lot of envious attention at the same time, De Soto has produced a dream car called the Adventurer (right). The company has no thought, however, of producing it in quantity.

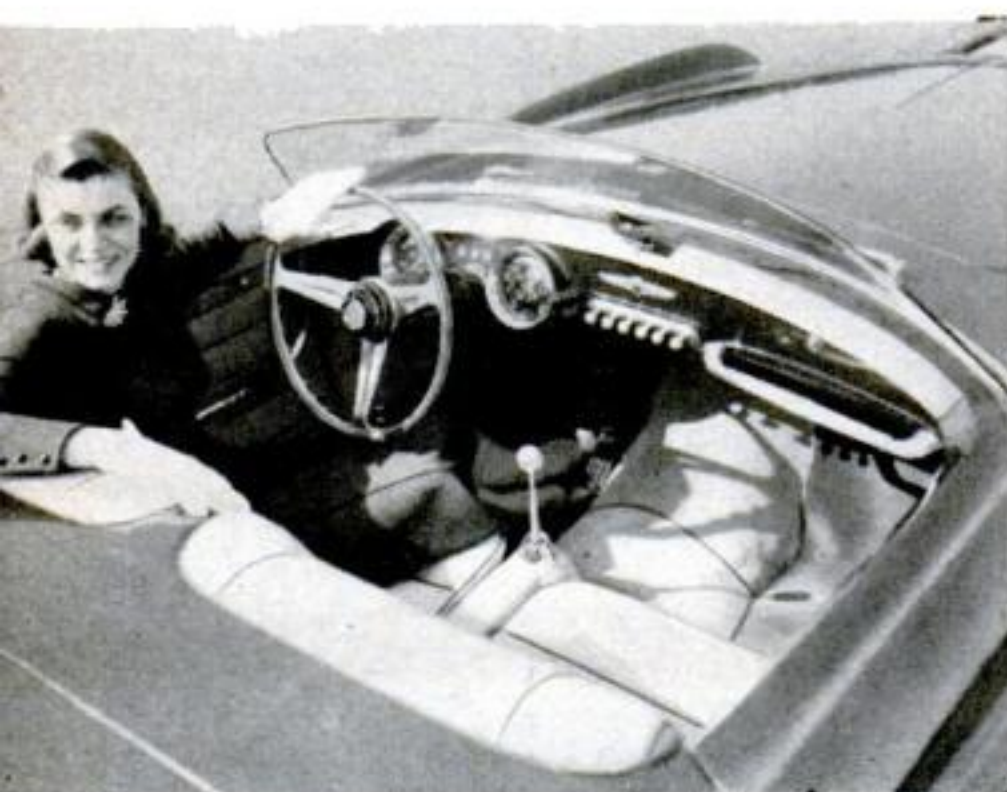
Less than 53 inches high, 185 inches long over-all, and with full cutout fender openings, the Adventurer is intended to remind you of Continental sports cars. But it seats four passengers in well-padded comfort (left), which no true sports car does.

The Adventurer provides lots of glass area front and rear and rolls on unusually large wire wheels (16-inch diameters) with knock-off hubs.

Powered by De Soto's 170-hp. V-8 engine, the dream car has a dual-exhaust system—the polished exhaust lines running along the outside of the body, just below the door sills.

These beauties are strictly for show and study—

Dodge Dabbles in Daring Design Close to Ground

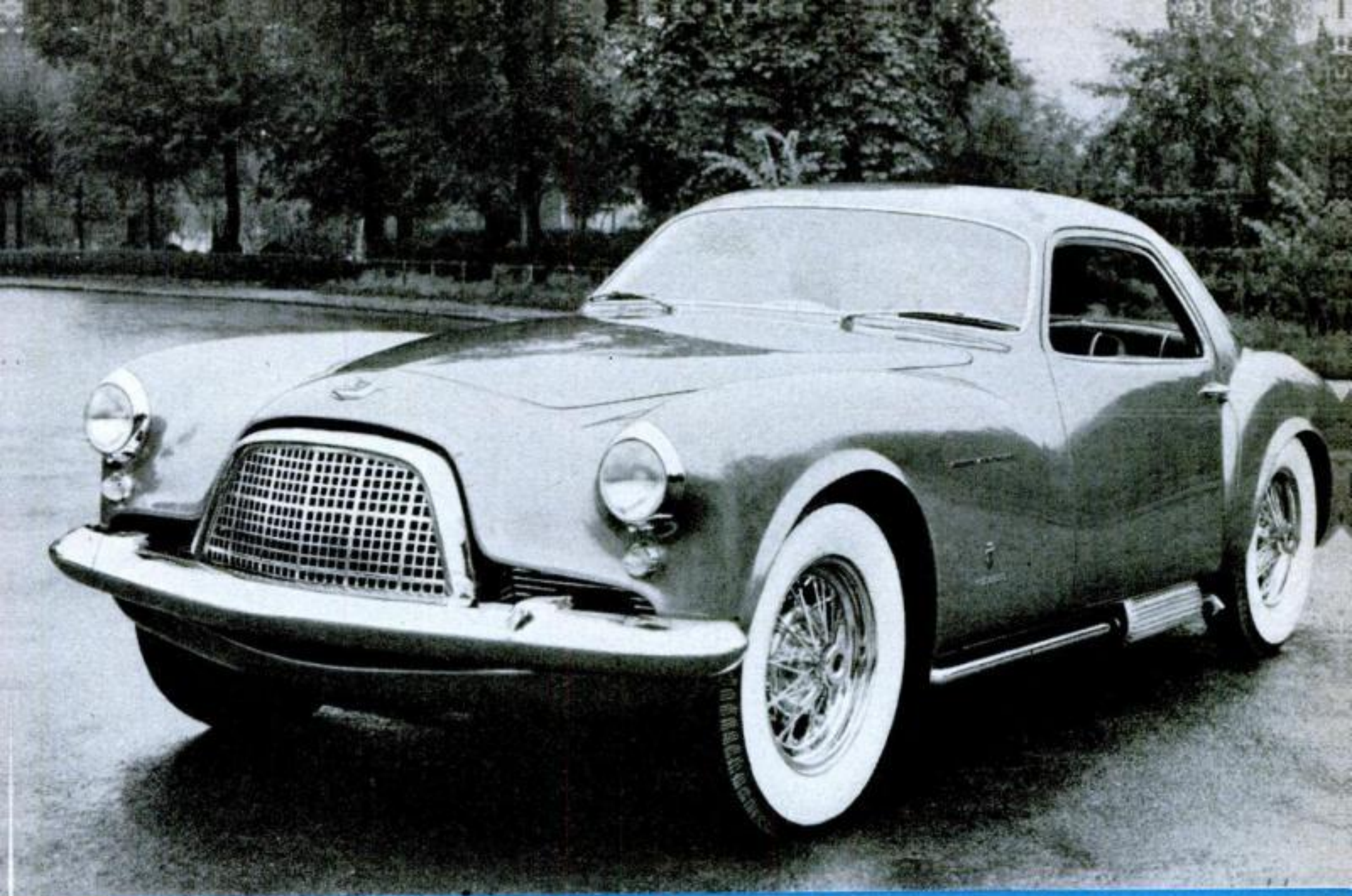


ANOTHER field day for designers and publicity men was enjoyed when Dodge produced its natty, single-cockpit Firearrow (right). Here, again, is a car that its maker has no intention of turning out for the public.

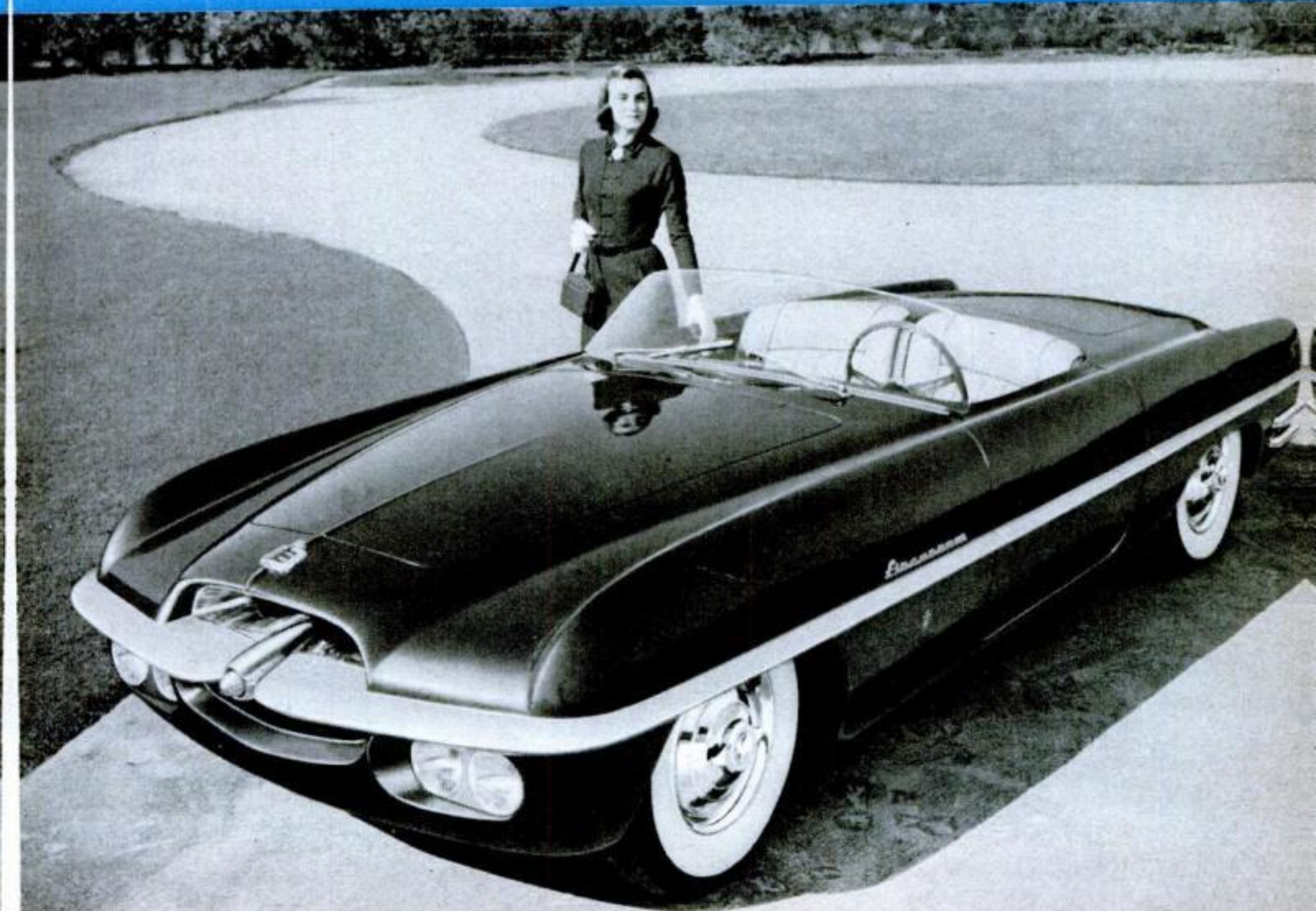
The Firearrow, 34 inches high at the doors and more than twice as wide as it is high, has a wheelbase 115 inches long. Its broad, sloping rear deck has two hatches, one for luggage and one for the spare tire.

Door handles were omitted. About the only ornamentation is a body-circling rub rail, painted grayish tan. The car itself is a deep metallic red, with maroon-piped yellow-buff leather upholstery.

The unusual instrument panel (left) features two big dials—tachometer and speedometer—with ammeter and fuel, oil-pressure and water-temperature gauges mounted in their centers.




you'll never be able to buy either one of them.





MARTIN 2-0-2



DC-4



WHAT A PILOT CAN SEE—and can't see—from his seat in various airliners is accurately measured and recorded by a special robot

camera (center, above), developed by safety experts of the Civil Aeronautics Administration. Mounted in the pilot's seat, the two-eyed

*Can airline fliers clearly see where they're going?
U.S. probers seek answers as in-flight crashes rise.*

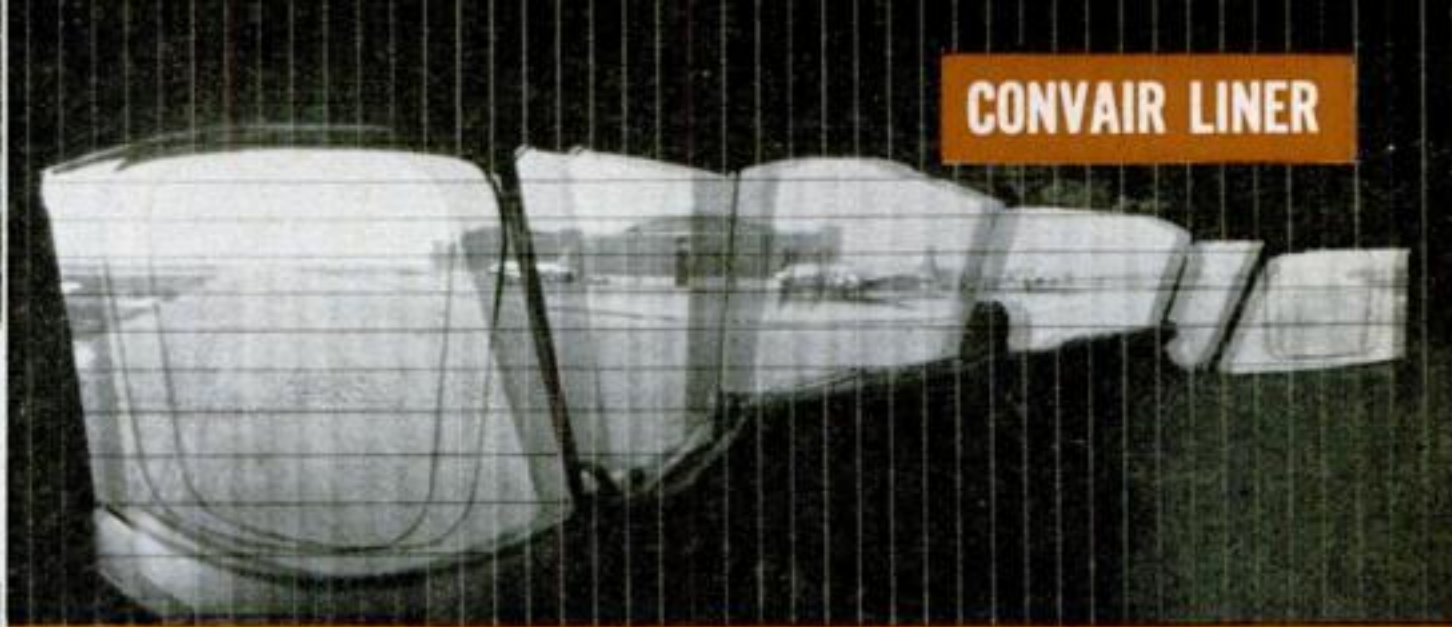
Scientists Tackle Pilots' Deadly Blind Spots

By George H. Waltz Jr.

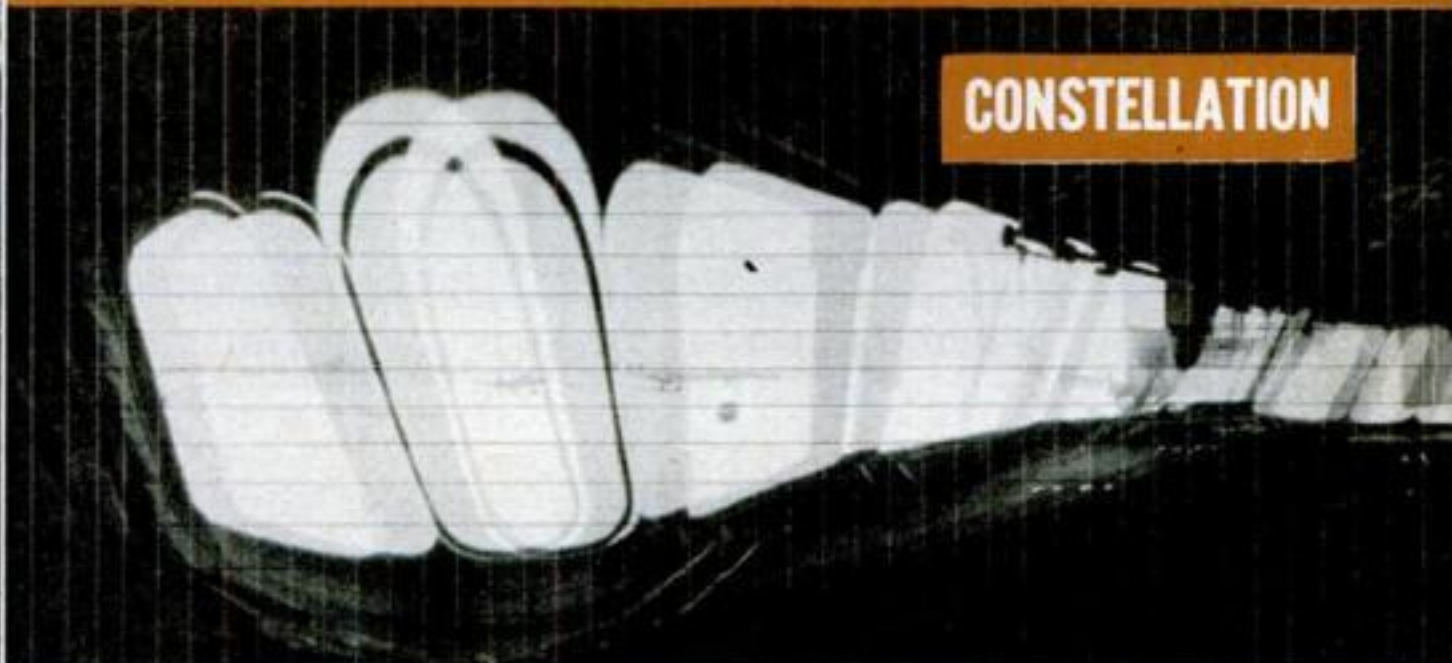
JUST at dusk last August 26, one of the strangest airplane accidents in recent years occurred two miles over Michigan City, Ind.

Two regularly scheduled airliners—both big, sleek, modern twin-engine Convaairs—flying in the same direction collided in mid-air. Fortunately, it was a “brush” collision. The propellers of each plane chewed into the fuselage of the other, but the damage wasn't great enough to prevent the pilots from easing their planes down to safe landings. Not one of the 57 passengers was even hurt.

What made the accident strange was the fact that the weather was good, both planes were flying straight and level, and neither was experiencing any mechanical troubles. The two planes had taken off from Chicago shortly before, a minute apart. The pilots had been



CONVAIR LINER



CONSTELLATION

robot scans the windshield just as a pilot would do. It even leans forward, as a pilot would to increase his range of vision. The re-

corded results in four of the most popular types of commercial aircraft are shown in the panels at left and right above.

cleared to fly "visual flight rules," and both had decided to fly at 11,000 feet, where the winds were favorable. Visibility was good. Radio contact was normal. There seemed not a reason in the world why the planes shouldn't reach their destinations—Detroit and Cleveland—safely and on schedule.

Yet, cruising along in the twilight, they collided, one plane slipping across and under the other. And the strangest part of all is that, while several of the passengers in each plane later testified that they had seen the other plane and had wondered about the slowly narrowing distance between the two, *neither the pilot nor the co-pilot of either plane had seen the other!*

Too Frequent to Be Freakish

The accident could be classed as a freak—a once-in-a-million chance—except for one fact. In the U. S. in the last five years there have been 86 in-flight collisions, and in 82 of them the weather was good and the visibility was good.

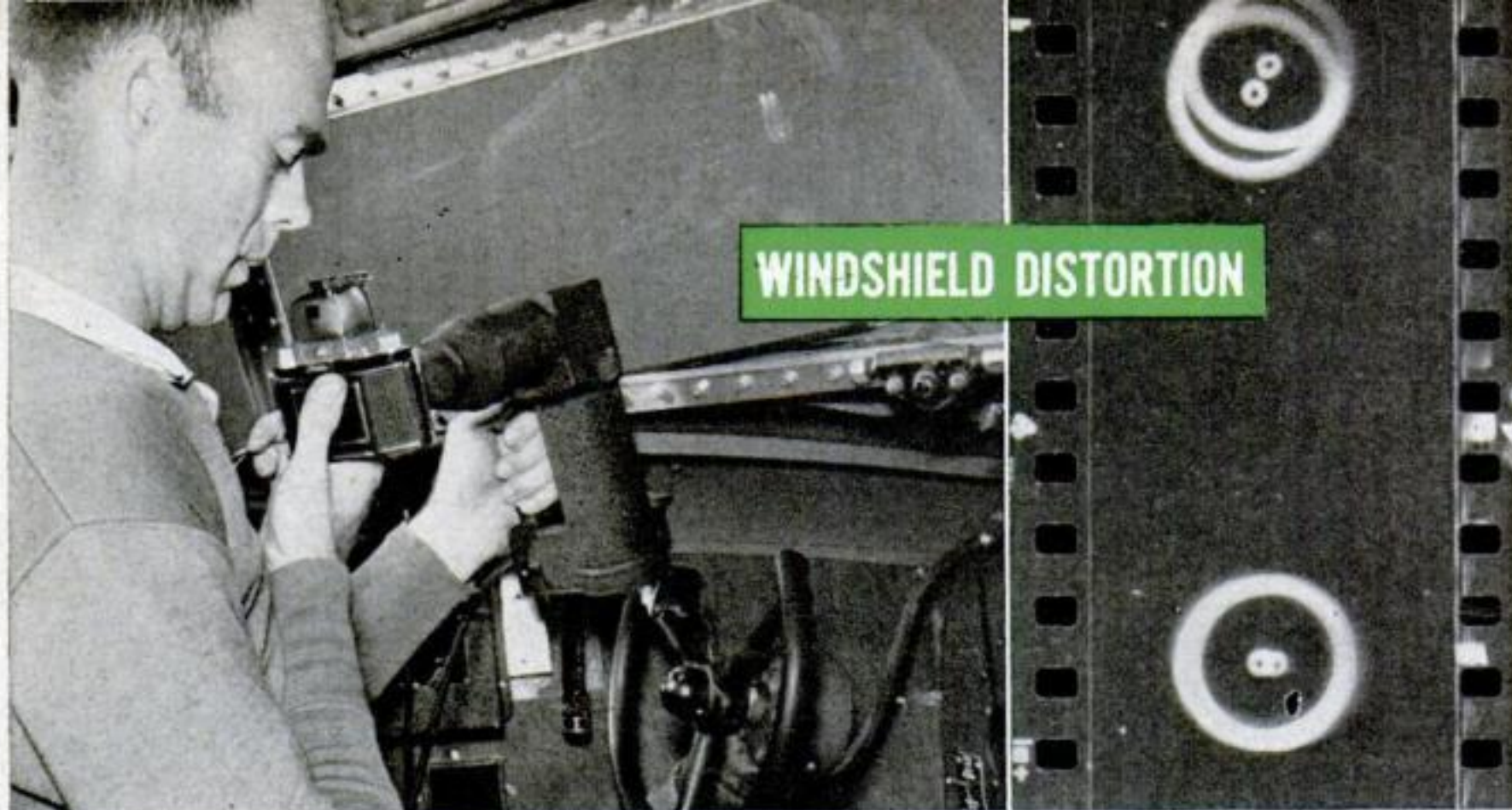
Last August's accident, fortunately, triggered a chain reaction of controversies, discussions and inquiries revolving around two questions:

- Does the pilot of a modern transport plane have good visibility—can he see what is around him when he is in flight?
- If not, what is being done about it?

The answers are many.

For the most part, the aircraft designers naturally feel that the visibility from the cockpit of a modern airliner is adequate and in line with the demands of streamlining and the needs for strength to withstand the air pressures of high-speed flight.

The airline people—pointing accusing fingers at the fact that 83 of those 86 in-flight collisions involved a private plane—feel strongly that the private fliers are at fault and that they should be restricted in their activities, or at least be made to fly under the same regulations as commercial planes. They argue that under present rules a private flier can just about take off from any spot



WINDSHIELD DISTORTION

WINDSHIELD WAVINESS that can distort a pilot's vision is investigated by another CAA

camera. If glass is wavy, film record (above) shows two circles of light instead of one.

As airline people and private fliers blame each other

and head for anywhere without notifying anybody, that he can mosey in and out of congested airport areas at will, and that he can operate in and out of the airways without adequate communications facilities.

The country's 40,000 private pilots, on the other hand, counter by putting most of the blame on the airlines. Through their organization, the Aircraft Owners and Pilots Association, they say:

"It is alleged by airline proponents, both inside and outside the government, that near misses and collisions are caused almost entirely by private aircraft, in relatively bad weather, and under conditions beyond the control of the pilots involved. These allegations are simply an attempt to cover up the actual facts. These incidents, when they happen, invariably take place in good weather, are invariably the result of negligence or carelessness, and are invariably violations of regulations already in being.

"We cannot escape the fact that we have large numbers of large aircraft flying daily throughout the country at speeds from 200 to 350 miles an hour. And yet these very aircraft, operating in three-dimensional space, have less visibility available to the men flying them

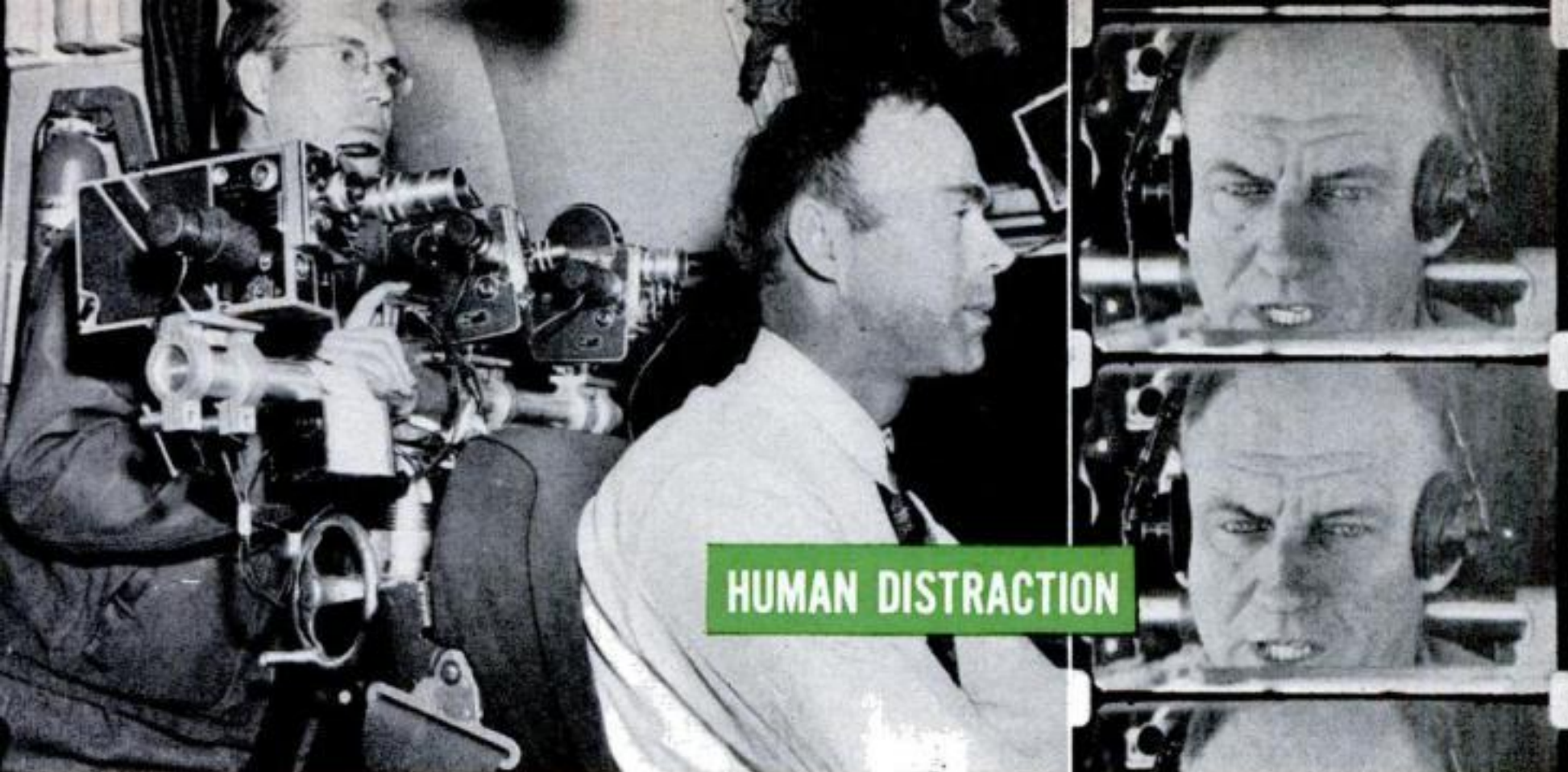
than is available to the average motorist driving his car 50 miles an hour in two-dimensional space."

Most airline pilots, talking informally, admit that cockpit visibility could be better; but they hasten to add that even if it were better, they probably couldn't be any more on the alert than they are now because of the multitude of instruments they must watch and the paper work they must do between take-off and landing.

CAA Frets Over Cockpit Visibility

Officials of the Civil Aeronautics Board and of the Civil Aeronautics Administration, which enforces the flying safety rules the Board makes, are gravely concerned.

For some time now the CAA Technical Development and Evaluation Center at Indianapolis, Ind., has been conducting extensive studies in cockpit visibility. The work received added impetus a few years ago when a detailed questionnaire distributed to 6,000 regular airline pilots pinpointed one startling fact: Of all the pilots answering, one out of every four admitted that at some time in his commercial flying career he had been involved in, but by luck had



HUMAN DISTRACTION

PILOT'S EYES ARE WATCHED by movie cameras that simultaneously record the view. If he

wasn't looking where he should have been at any moment, film (above) blabs on him.

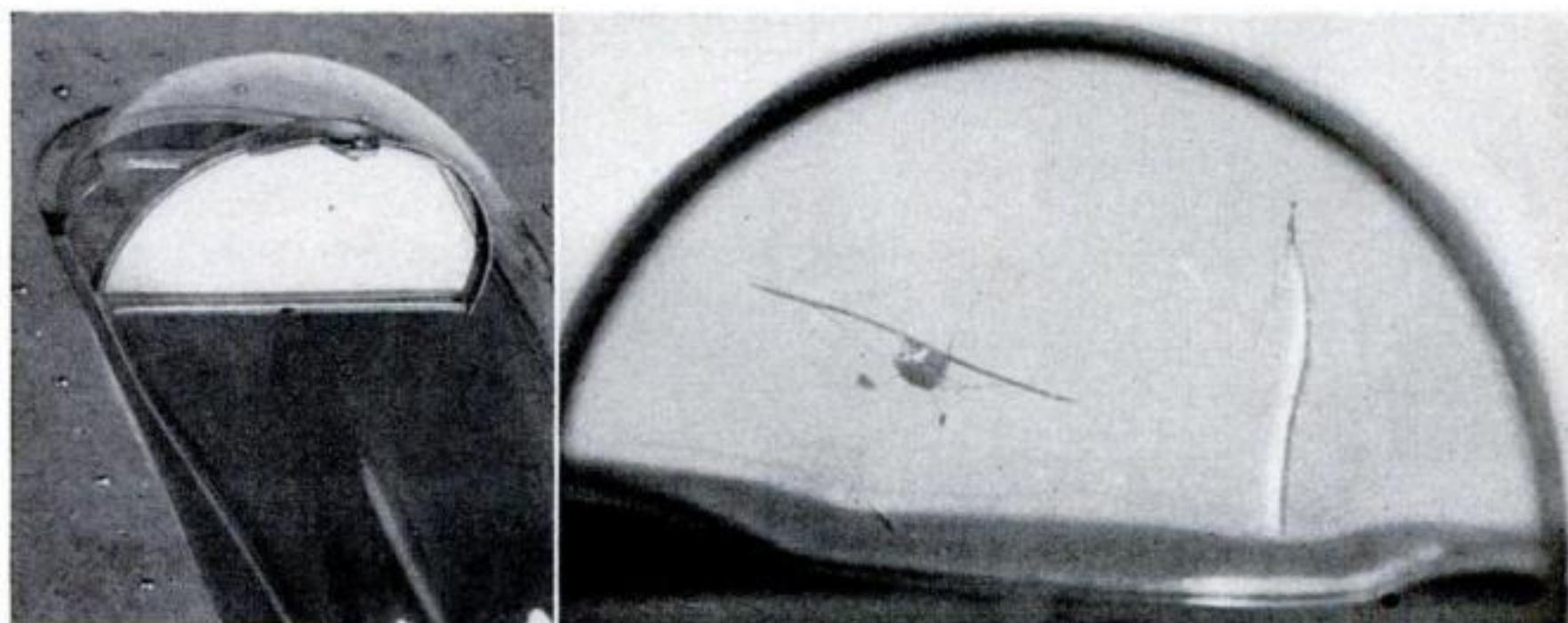
for collisions, ingenious cameras study safety hazards.

escaped from, a near collision caused, he felt, by poor cockpit visibility!

To measure the visibility from various types of cockpits accurately, CAA technicians have developed a special two-eyed panoramic camera. It is a robot camera that can be mounted in the pilot's seat with its twin lenses adjusted to normal eye level. Driven by an electric motor, the camera's eyes rotate automatically, just as a pilot's eyes would in scanning the cockpit's windows and windshield. The camera even leans forward at certain points, just as a pilot might do to extend his range of vision. When

the film is developed it provides a scaled picture of just what a pilot of that particular plane can see *and can't see* from his normal position at the controls. The films give an accurate, measurable basis for comparison in judging the relative visibility from the cockpits of all aircraft.

Another ingenious CAA photographic device makes a running record of exactly where a pilot looks when he is actually flying a specific aircraft. Mounted directly behind the pilot, the recorder—an arrangement of three motion-picture cameras—not only photographs



REAR-VIEW MIRRORS have been suggested as one way to improve cockpit visibility. At left

above is one installed in the roof of a small plane. At right is what the pilot might see.



ONE ANSWER to the problem is the larger windshield—21 percent bigger than before

—of the new Super Constellation. Still, the pilot could see more in, say, a bomber.

the pilot's eyes through a series of mirrors but also simultaneously photographs the horizon out ahead as seen through the windshield of the airplane. By comparing the exposed films, frame by frame, it is possible to tell just where the pilot was looking at each instant during a flight.

In one recent test, five groups of airline pilots were checked as they flew a Boeing Stratocruiser. Among the many findings outlined in a CAA report of that test, one fact stood out: "The results of the current study show that transport pilots attempt to search for other aircraft, but may be prevented from seeing them because of the windshield structure."

And yet, the Stratocruiser is considered by many pilots to have better cockpit visibility than any other transport plane.

At the CAB hearing following the recent Indiana collision, a good many general suggestions were made as to what should be done to reduce the possibility of in-flight crashes. They included the use of high-intensity flasher beacons on the tails of all commercial aircraft, the cutting in of additional cockpit windows in airliners, the installation of periscopes for side and rear vision, the use of airborne radar to detect mountains and storms as well as other aircraft, and the

painting of wide stripes of a vivid color, like orange-yellow, on the wings of all civil aircraft to make them stand out against gray skies and other similar silver-gray backgrounds.

New Ideas Tested, Some Used

Some of these suggested solutions to the problem are not only being tested but are being put into use.

High-intensity flasher beacons are already being installed on the tails of the airplanes of two major airlines.

Several airlines are now carrying on extensive experiments with the latest types of airborne radar.

New plane designs include more windshield and window area in the cockpits. An example is the new, bigger windshield in the Super Constellation, which gives the pilot 21 percent more visibility than earlier models.

Both the Air Force and the Navy have been experimenting with the coloring of aircraft to make them stand out against backgrounds of land, sea and air. Following the lead, the manufacturers of light planes are also now using more chrome yellow and bright orange in the coloring of fuselages and wings. The tendency is definitely away from dull colors and shiny



JOKING SUGGESTION of private pilots is packet of cleaning tissue called "Anticol," for anti-collision.

[Continued on page 260]



Look What Modern Art Did to the Old Jungle Gym

NOBODY will chase the boy off that modern sculpture—it's meant to be played on. One of a new series of recreation equipment, it is designed to put "esthetic beauty" into

playgrounds, give city kids the fun of scrambling over trees, rocks and caves. It is made of reinforced concrete by Creative Playthings, Inc., 5 University Place, NYC.



Bananas Come in Plastic Bags

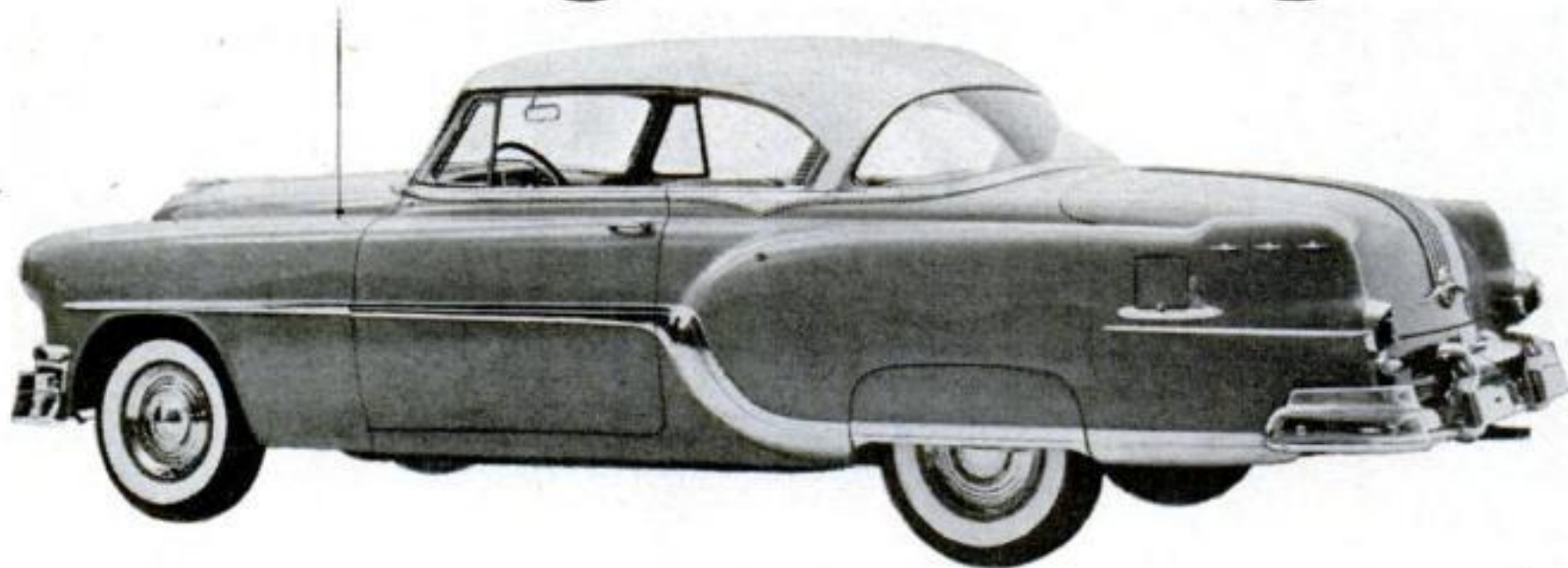
FRESH as when they were picked, bananas are now arriving from Central America in big bags of transparent plastic, which are slid over bunches of the fruit the way you'd put on socks. The new bags, introduced by United Fruit Co., retain moisture and prevent abrasion and friction burns.



Model Dog Delivers Lectures

VESTA (above) is a life-size Great Dane of plastic with Plexiglas skin, made in Germany to tour the U.S. One side reveals her internal organs, the other her bone structure. She's wired for sound and delivers a lecture about herself. As she discusses her innards, each part referred to lights up.

Plush New Pontiac Is Longer and Stronger



LIFT the deck lid on the '54 Pontiac "Star Chief" and you find a luggage compartment 11 inches longer than on standard Pontiac models. The entire added length of



this newest line in the company's stable of cars has gone into the back end. Three stars on a modified "fishtail" identify it.

Four models are available in the line—a hardtop (above), custom four-door, a fancied-up four-door (left) and a convertible. All have the Pontiac eight-cylinder engine, up from last year's 122 hp. to 127, and Hydra-Matic drives.

As an added attraction, the Star Chief line offers a series of colors not obtainable in other Pontiacs. If you'll look closely you'll find, in addition to the stars on the fenders, a chrome plaque at the rear windows. The wheelbase is 124 inches, two inches longer than that on the regular lines. This is to assure a better distribution of the weight imposed by the longer body.

FACTS ON '54 PONTIAC

Model: Star Chief hardtop.

Engine: 8-cyl. in-line L-head; 127 hp. at 3,800 r.p.m.; compression ratio, 7.7:1; piston displacement, 268.4 cu. in.; piston travel (in feet per car mile at 30 m.p.h.), 1,481; bore and stroke, 3 $\frac{3}{4}$ " by 3 $\frac{3}{4}$ "; torque, 234 lb.-ft. at 2,200 r.p.m.

Weight: 3,500 lb. (approx.); per hp., 27.5 lb.

Transmission: Hydra-Matic; rear-axle ratio, 3.23:1.

Steering ratio: 25.1; radius of turning circle, 22 $\frac{1}{2}$ '.

Effective brake lining area: 171 sq. in.

Springs: front, coil; rear, semi-elliptic.

Outside dimensions: height, 63.2"; overall length with bumpers and guards, 213.6"; width, 76.6"; wheelbase, 124"; overhang, front 34.5", rear 55.1"; tread, front 58.5", rear 59".

Inside dimensions: seat cushion width, front 59.8", rear 60.7"; leg room, front 42.8", rear 42.6"; headroom, front 36", rear 35.5"; seat height, front 13.8", rear 12.5"; vertical distance, steering wheel to seat cushion with seat in mid-position, 5.2"; front seat adjustment, horizontal 4.5", vertical 1.7".

Tire size: 7.10 by 15.



Fisherman Reels in Catch Without Leaving His Office Desk

PAT HIGGINS, owner of a 2,300-acre farm in Texas, does his fishing in solid comfort. Seated in his air-conditioned office built on stilts over an irrigation pond, he flips up a trap door and drops a line through the floor. Most of his ponds have been stocked and while the bluegills were growing to fishing size, the schools that gathered under the trap door were fed daily.



▶▶▶A new fuel for kerosene lanterns is said to burn without any disagreeable odor while providing a clearer, brighter light. R. E. Dietz Co., Syracuse, N. Y. makes it.



Tractor Powers Road Roller

RIDE a tractor up the ramp on what the English call a Twose chassis and you have the motorized road-and-grounds roller above. A steering column dropped through the spokes of the tractor's steering wheel, and connected to the front roller by heavy chain, serves to guide the strange-looking vehicle.



British Get Heavier Heavy Tank

THE British War Ministry calls this tank "probably the most powerful in the world." The Caernarvon, it is claimed to have better armor and a more powerful engine than the Centurion which was used with great success by the Allies in Korea.

This Year You Can Buy

161 Chevrolets

...All Different



COLORS FOR '54 got preview by company bigwigs early last spring. Final choices were made during summer.

*And here's the arithmetic
on your varied choices:*

CHEVY ARRIVES at figure of 161 different-looking cars for 1954 by multiplying colors available by models in each line or "series." In solid colors, for instance, 210 series has two models available in 10 colors plus one model in six colors and one model in three colors—total 29. Adding solid colors and two-tones gives grand total of 161.

Solid Color Cars

$$\begin{array}{rcl} 150 & 10 \times 3 + 2 & = 32 \\ 210 & 10 \times 2 + 6 + 3 & = 29 \\ \text{Bel Air} & 9 \times 2 + 4 + 3 + 8 & = 33 \\ & & \hline & & 94 \end{array}$$

2-Tone Cars

$$\begin{array}{rcl} 150 & 4 \times 3 + 2 & = 14 \\ 210 & 7 \times 2 + 6 + 3 & = 23 \\ \text{Bel Air} & 9 \times 2 + 9 + 3 & = 30 \\ & & \hline & & 67 \\ & & \hline & & 161 \end{array}$$

*Want a distinctive-looking automobile? Now you
can get it—right off a standard production line.*

By Devon Francis

A MAN in Missouri wrote a letter the other day to the people who make Chevrolets with an idea that he thought was a dandy. Why not, he said, name one of the colors to be offered to the public in the 1954 crop of cars after a dear old lady, his maiden aunt? They could call it Agnes Pink.

As all big corporations do in such circumstances, Chevrolet replied gravely on starched stationery that the idea had profound merit but didn't quite fit in with its plans. Moreover—and here the company thanked its lucky stars for a

convenient escape hatch—it wouldn't be making any pink cars.

It's making them in just about every other color and hue, though. After the new Chevrolets were announced last month, someone totted up the number of choices in models, colors, hues and two-tone combinations that the buyer could get on the salesroom floor. It came to 161.

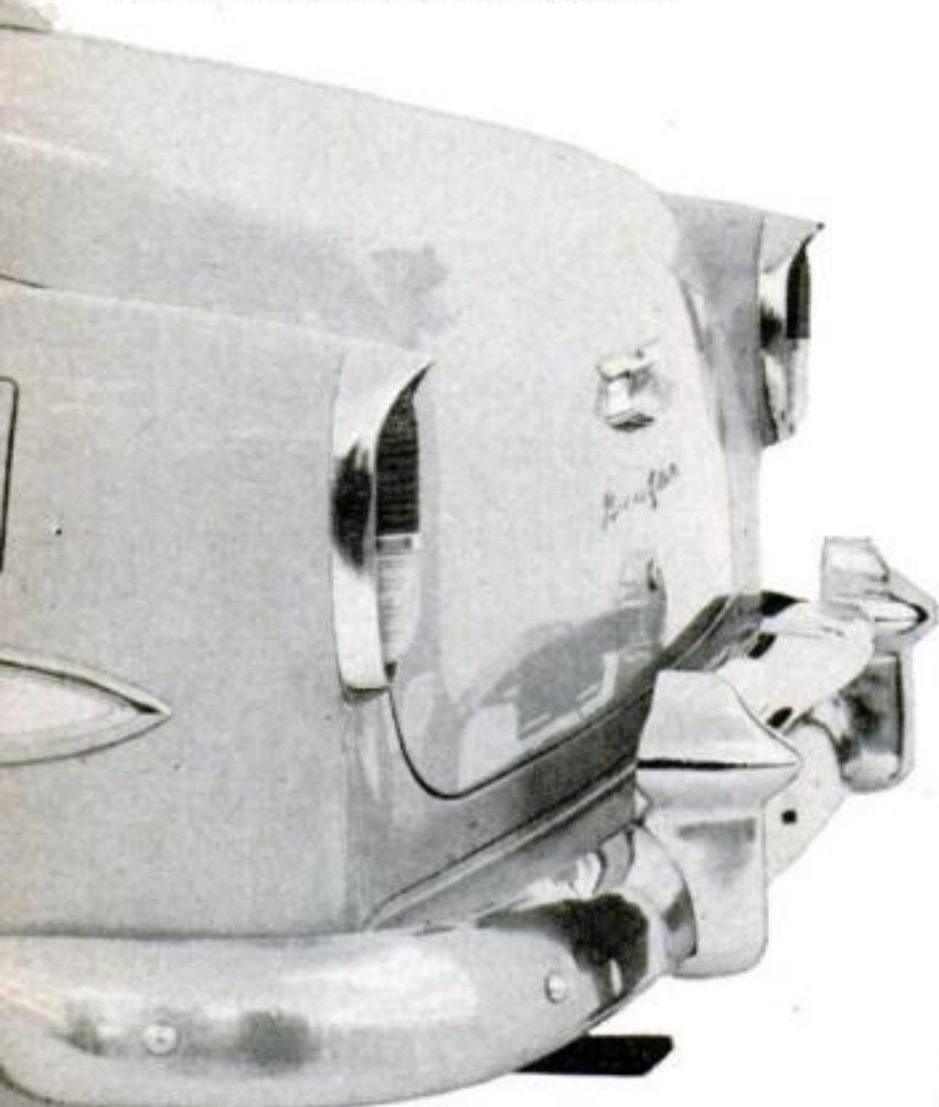
For 1954, Chevrolet—which makes and sells more cars than anybody else on earth—is offering green cars, blue cars, beige cars, brown cars, gray cars, red cars, turquoise cars, cream cars, tan cars and some in-between hues. You can even

'54 POWERGLIDE Bel Air can hit 60 in 18.4 seconds. 1913 Chevrolet could only make it downhill.





NEW HORN-RIM CAPS to match steering-wheel colors help spruce up interiors. Electric seat and window lifts are optional.



EYEBROWS on the tail lights are a '54 recognition feature. There's a new low-back-pressure muffler on all but convertibles.

FABRICS on seats and sidewalls and trim are richer. In Bel Air models cloths, combined with vinyls, are faced with nylon.



buy black cars. You can buy cars with ivory tops and turquoise bodies, beige tops and green bodies, and red tops with beige bodies.

You can buy a beige top with a red body and a silver wheel-stripe garnished with a maroon-and-beige trim. And when the man on the salesroom floor, showing all his teeth, gently tries to shoo you off an ivory-blue-silver-gray combination with an onyx-black treatment of the instrument panel, garnish moldings, lock buttons and steering-wheel rim and cap, on the plea that they don't make them that way, just say, "Better read your own sales literature, bub."

You can carry the differences a lot further than 161 Chevrolets for 1954. If you count in the number of variables possible in such factory-installed items as transmissions, brakes, steering and rear-axle ratios, the number of different cars gets to be astronomical. For a single model of a single line of Chevrolets this year—and there are 13 models in three lines in all—the figure is upward of 40,000.

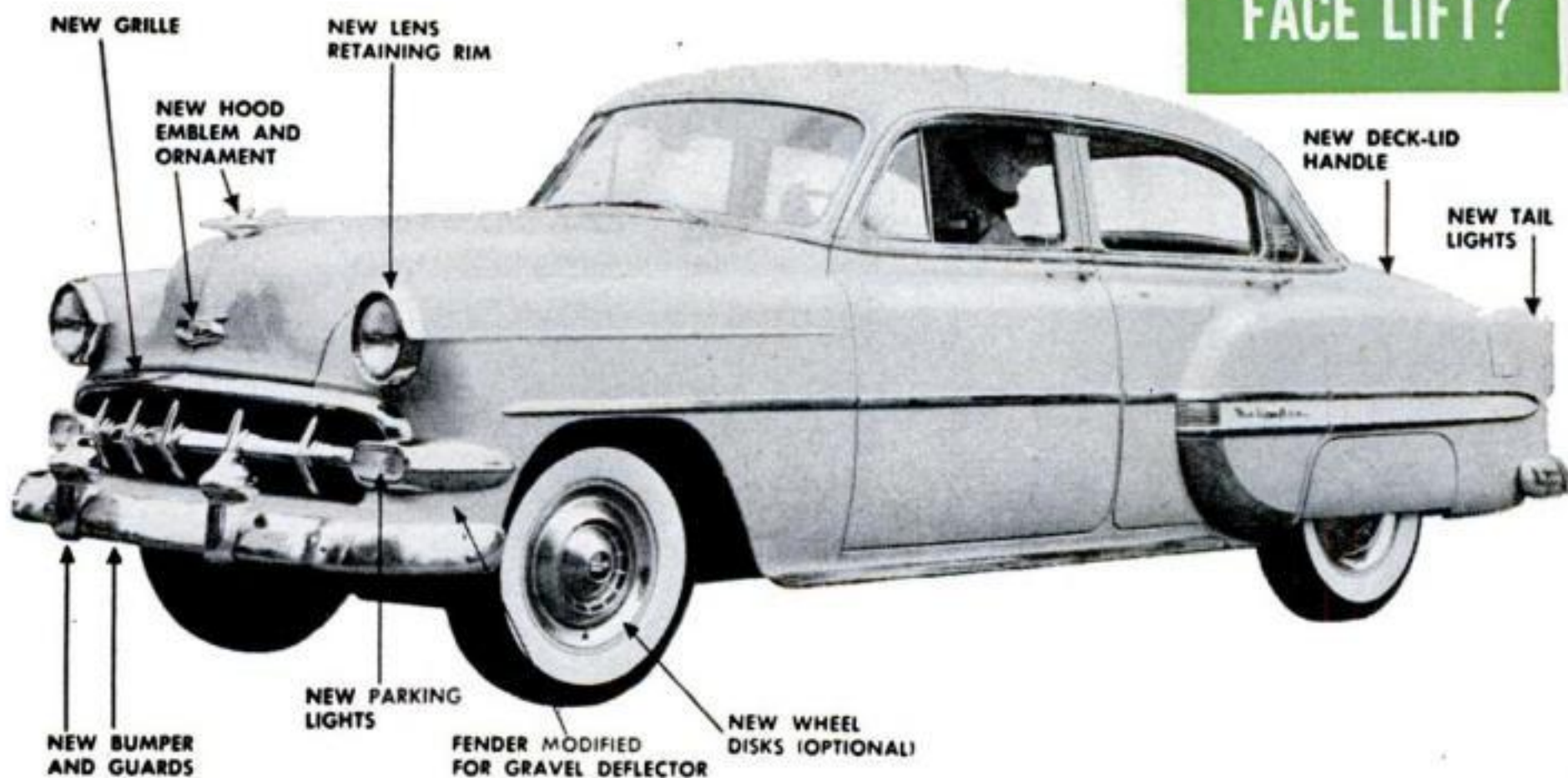
No Two Oshkoshers Would Have Same Car

That means that every man, woman and child in a city the size of Oshkosh, Wis., could each buy, say, a four-door sedan of Chevrolet's middle or 210 line, and no two of them would be exactly alike.

And this, bear in mind, does *not* count the multitude of possible variations with such dealer-installed accessories as radios, heaters, backup lights, seat covers and hare tails on the fender antenna.

The rash of colors in U. S. automobiles is relatively new. You could get colors long before World War II in fair variety, but the real profusion began only a couple of years ago. Gradually, color has come to share the emphasis put on the galloping horses in the new engines, automatic transmissions, power steering and air conditioning. The reason, of course, is that automobile owners want to be different.

Color variety in automobiles spawns



DETROIT LINGO for model changes made without replacing costly body dies, a "face lift" can add up to a big difference in looks. Not shown here is Chevy's mechanical news

for '54: the standard engine goes from 108 to 115 hp., Powerglide job from 115 to 125. A high-lift cast-iron cam does trick, helps performance in middle, upper ranges.

endless stories in the cloakrooms of Detroit's factories. One of them is the Case of the Frightened Female. It seems that Chevy turned out 7,700-odd cars last year of a special color, one for each of its dealers. The cars weren't offered for public sale. These cars were strictly show jobs. Some of the dealers, nonetheless, disposed of the cars to customers. One fell into the hands of a matron who scared easily.

One day, out driving, she noticed a car following her. At its wheel was a man. Every time she turned, the man turned. She drove around the block. The man followed. Desperate, she pulled up beside a cop.

"That man's following me," she reported.

The cop stalked back to interview the suspected driver. He returned in a moment grinning. "The guy in that car," he reported, "says this here color car you got is a dealer's car. He's a Ford salesman and he's following you around to see where you stop so he can spot your sales prospects."

The most striking change in the public's taste in automobile colors is the growing popularity of the pastels—a light tan, for instance, in preference to a

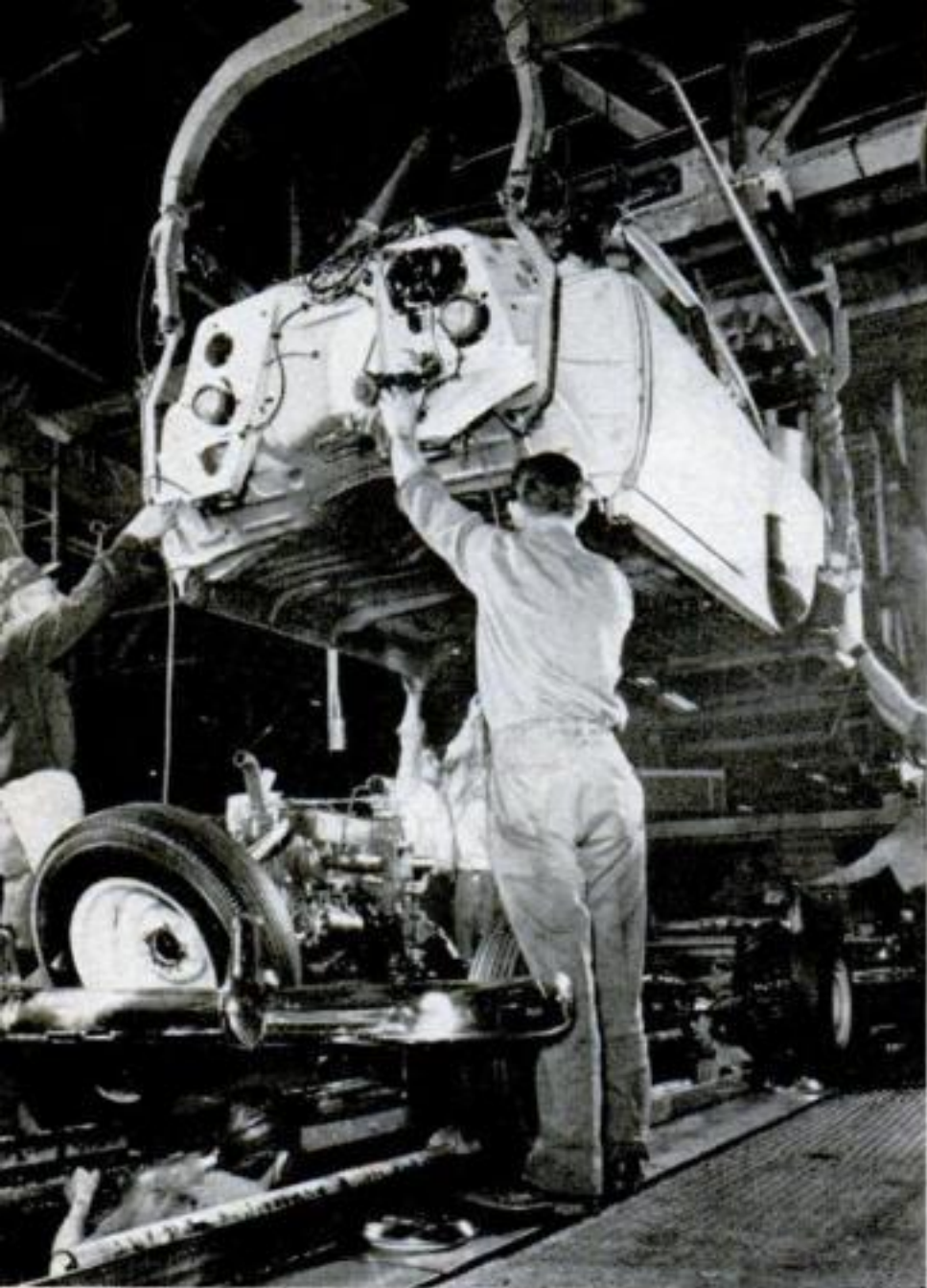
brown. Yet, with 22 colors and hues to choose from, car buyers—reports Du Pont, one of the suppliers of finishes to the industry—chose only five in bulk. They were light green (by far the most popular), light blue, dark green, light gray and black, in that order of preference. Clear down on the list were blue-green, maroon, light red, light brown, medium red, medium gray, tan and dark red.

If you want a genuine oddity, buy a white car. Hardly anybody orders one. Better yet, buy a reddish mustard. *Nobody* wants that.

Bright Hues Go with Good Times

The Chevrolet people, wading around in oceans of statistics, report other quirks in the public's tastes. The evidence tends to indicate that in good times people buy snappy colors and in bad times the mood is for somber ones. Year to year, the northeastern states order the darker colors while Florida, the entire West Coast and the southwestern states like the lighter ones. In the Midwest it's 50-50.

Color in automobiles first began to tickle the buyer's fancy in the mid-Twenties—not long after Henry Ford, rid-



BODY DROP on production line dramatizes incredible scheduling job in making 161 combinations of body and color. Magically, the right wheels, body, chassis always meet.

ing a crest of popularity, fliply told a dealers' convention: "Gentlemen, you can have any color you want, so long as it's black." He lived to see his cars light up like pinball machines.

Color was becoming a definite factor in buyer preference by 1926. The new pyroxylin finishes, a guarantee against

peeling, had been introduced. Manufacturers began leavening their traditional black with other colors. A decade later Edgar A. Guest, the newspaper poet, was writing:

When I was but a little lad
Few were the colors that we had
Then red was red and blue was blue,
And that was all we ever knew;
But since they have made the motor car
Behold how many shades there are!

That year, by the way, Eddie Guest himself was driving a two-tone Cadillac finished with what Du Pont, in an excess of ecstasy, called Piccadilly Brown and London Smoke.

But far more black cars were sold than any other. Today black accounts for less than one-tenth of the entire market.

Gimmicks and Color Vie for Attention

Exactly 20 years ago Chevrolet made 11 models in two lines, in seven solid, darkish colors, including black.

As late as 1941 Chevrolet was offering a choice of pretty somber colors—13 of them—in all its models. Three more colors were available only in three specific models. One pastel turned up. Black predominated. But the two-tone idea had taken root. There were four of those in the catalogue.

Now the latest mechanical gimmicks have to compete with color for the buy-

[Continued on page 262]

FACTS ON '54 CHEVROLET

Model: 210 series four-door sedan.

Engine: 6-cyl. with overhead valves; 115 hp. at 3,700 r.p.m.; compression ratio, 7.5:1; piston displacement, 235.5 cu. in.; piston travel (in feet per car mile at 20 m.p.h.), 1,816.5; bore and stroke, 3 9/16" by 3 15/16"; crankshaft bearing surface, 29.37 sq. in.; torque, 200 lb.-ft. at 2,000 r.p.m.

Performance weight: (curb weight plus 600 lb.) 3,960 lb.; per hp., 34.43.

Transmission: Three-speed synchromesh (optional Powerglide torque converter with 125-hp. engine).

Steering ratio: 23.1:1 manual; 22.1:1 power; radius of turning circle, 19'.

Effective brake-lining area: 158 sq. in.

Springs: front, coil; rear, semi-elliptic.

Outside dimensions: height, 63 3/4" at design load; over-all length with bumpers and guards, 196.44"; width, 75"; wheelbase, 115"; overhang, front, 33", rear, 48.44"; tread, front 56.70", rear 58.77".

Inside dimensions: seat-cushion width, front 59.9", rear 60.5"; leg room, front 42.7", rear 41.4"; seat height, front 13.5", rear 12.6"; vertical distance, steering wheel to seat cushion with seat in mid-position, 4.4"; front-seat horizontal adjustment, 4.4".

Tire size: 6.70 by 15.



Just Two-by-Sixes Glued Together Make Roof for Big School

RESEMBLING an airplane hangar, the arched shell above will become the auditorium for the \$1,250,000 junior high school at Lynnwood, Wash. The sweeping arches, which are the sole support for the roof, are

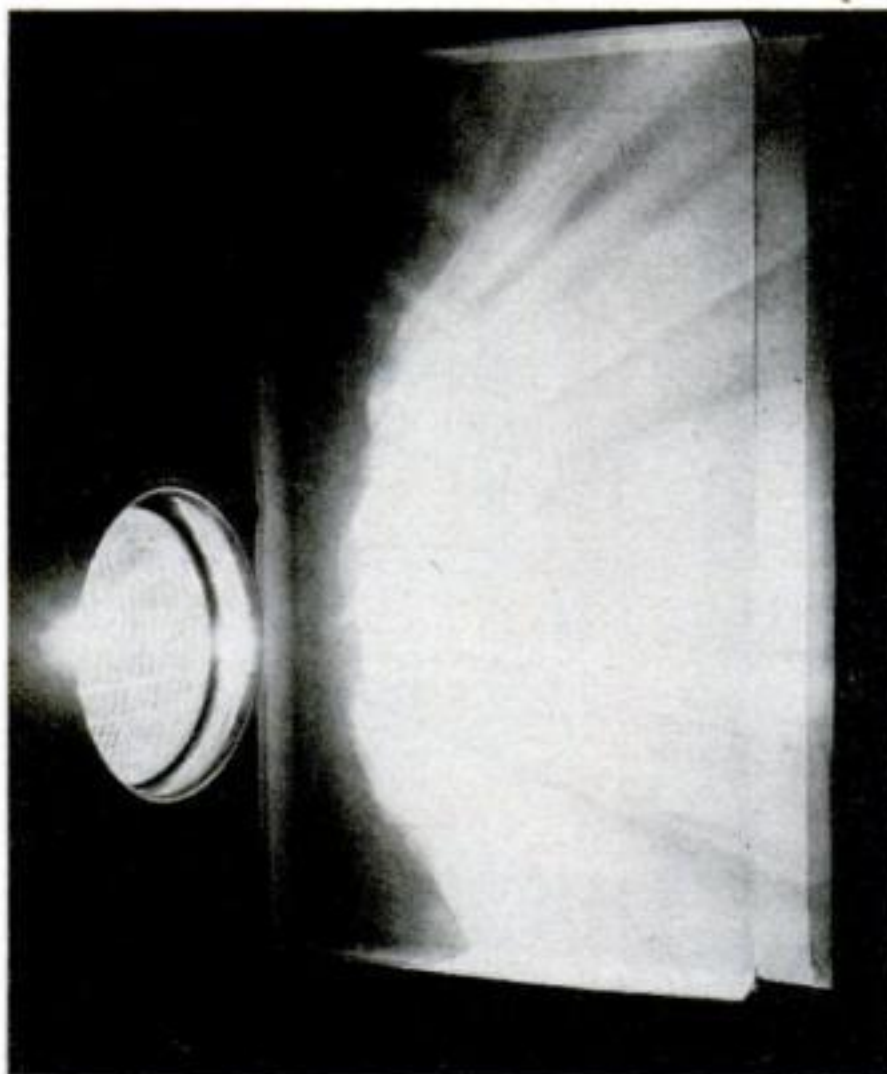
simply wood two-by-sixes cut to the proper arc and glued together. Each arch consists of three of these laminated members, swung into place with a crane and then bolted. The architect is William Arild Johnson.



Not on the Wall, Junior—Do Your Drawing on the TV Set!

A NEW TV program for youngsters puts them right in the act. Winky Dink, a cartoon character, encourages them to draw on the TV screen! A kit sold to the budding artists contains a transparent film to fit

over the glass (above left), a box of crayons and a wiping cloth. As CBS's Jack Barry draws simple pictures on a transparent easel in the studio, the youngsters trace his lines (above right) at home.



TODAY'S LOW BEAM, its pattern reflected on a piece of cardboard held beside a present sealed-beam headlight, is surprisingly scattered. Lots of light is going to waste.



TOMORROW'S LOW BEAM is concentrated where it will do most good. The cap on the filament creates a dark area where light now escapes to dazzle approaching drivers.

New Headlights Will Cut Down Glare

SOMETIME this year, you'll be able to install brighter, better sealed-beam headlights than the ones now on your car. They'll spread more light across the entire highway.

And at the same time, in the low-beam position, they will sharply reduce the glare that now distracts approaching drivers, improve visibility in fog and storms and illuminate the curb and road shoulder better than your present lights do.

Wattage of the high-beam filament in the

new headlights, which are a joint achievement of leading manufacturers, has been stepped up from 45 to 50; that of the low-beam filament from 35 to 40. Both filaments are capped, which accounts for the fog-lamp effect and reduced glare. Redesigned flutes in the lens concentrate low beams on the shoulder of the road.

As soon as the various states formally approve the new headlights, probably within 10 months, you will be able to substitute them for your present ones.

They Say Now

W. D. EVANS, ELGIN NATIONAL WATCH CO.: "... The father who urges his son to study watchmaking is giving him the best possible background to work successfully ... in modern micro-instrumentation work."

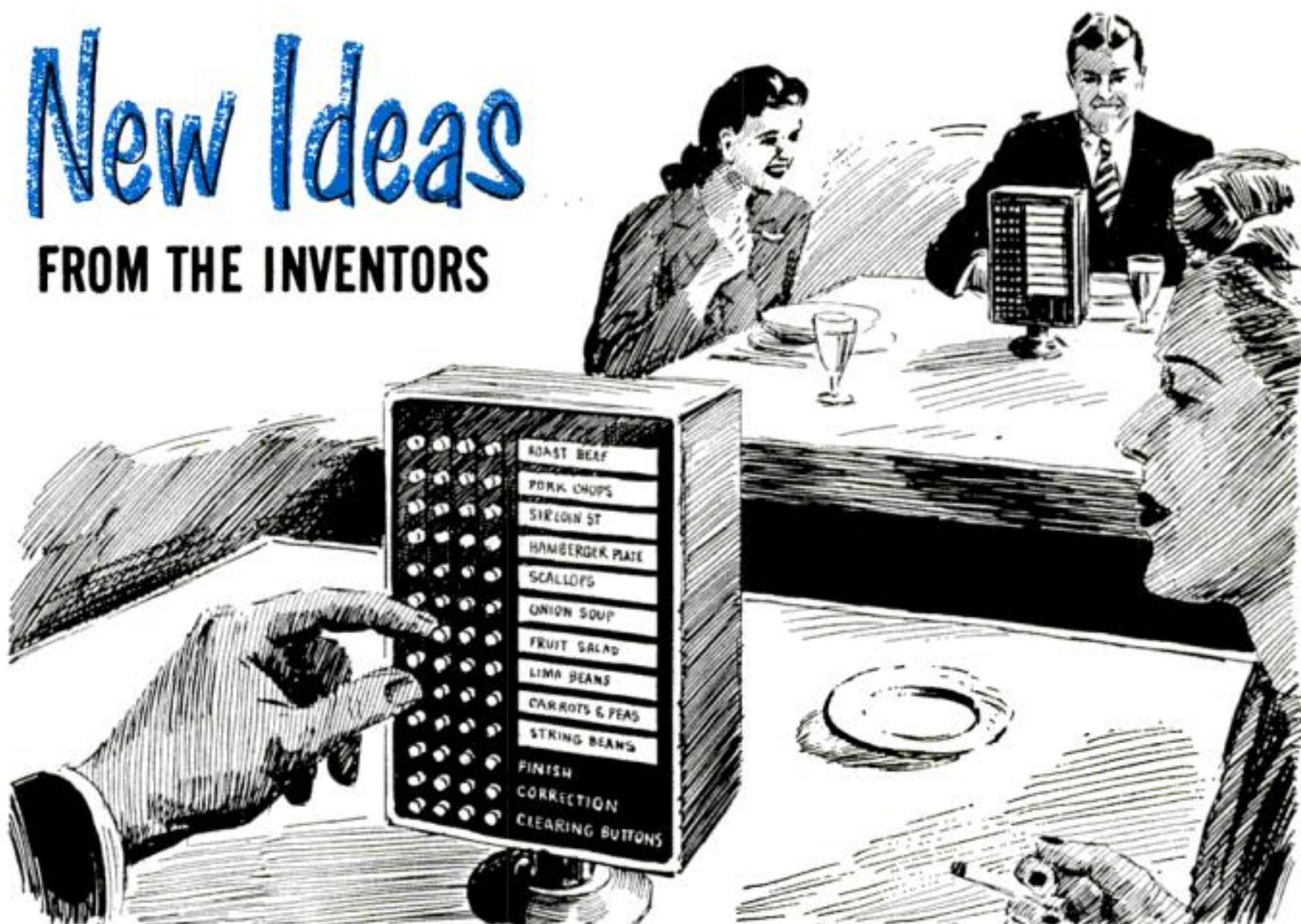
CLARENCE J. PFAFFENBERGER, VICE-PRESIDENT, GUIDE DOGS FOR THE BLIND: "There is no reason why a puppy can't be quite happy in an apartment. Dogs like mental exercise better than physical exercise . . ."

JOHN WILLIAMS STREETER, HISTORIAN OF SCIENCE, FRANKLIN INSTITUTE: "Today the cry is, 'All first-class mail by air,' a service now being tried by the Post Office on an experimental scale. In 25 years the guided-missile interests will be well enough organized to be campaigning for: 'All first-class mail by rocket.'"

DR. FIRMAN E. BEAR, RUTGERS UNIVERSITY: "Soil consists mostly of substances that plants don't need and can't use."

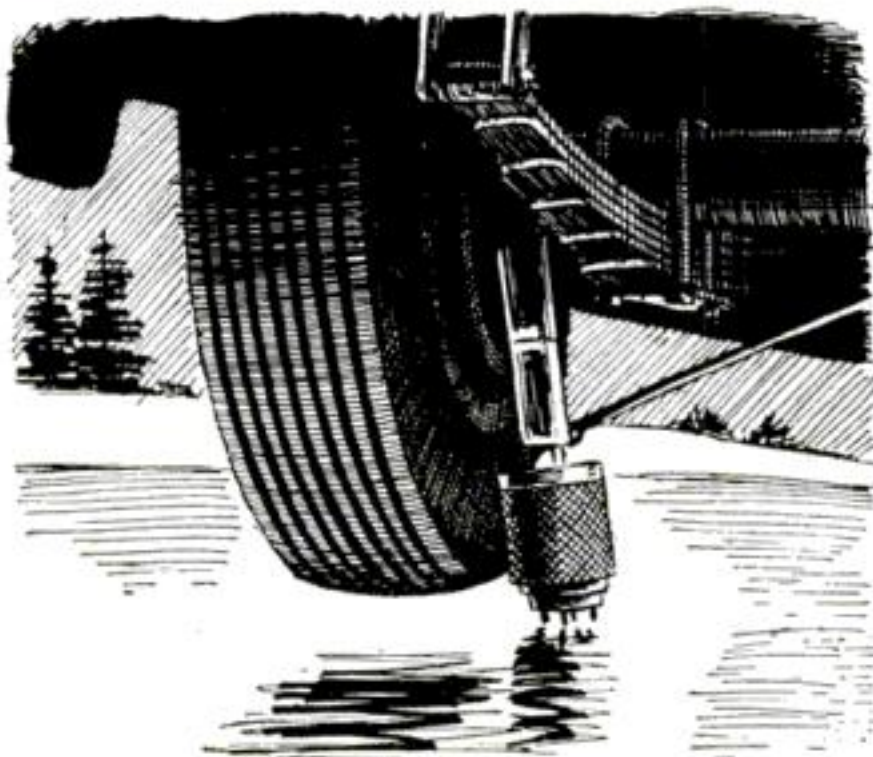
New Ideas

FROM THE INVENTORS



1 Push Buttons to Order Dinner. Waiting for the waiter would become a thing of the past if restaurants adopted this electrically operated menu. A box mounted on or near each table would display the day's

bill of fare alongside rows of switches. By pushing buttons the customer would register his order and table number on a panel in the kitchen. The system is designed to speed service and reduce errors.



2 Creeper to Grip Icy Road. Rotating lugs on this traction booster would help start or stop a car on ice. Normally the device would be retracted, but when needed it would be lowered into contact with the road and rear tire. Even a skidding wheel would turn the cross-hatched cylinder and cause the ice-gripping lugs to move the car.

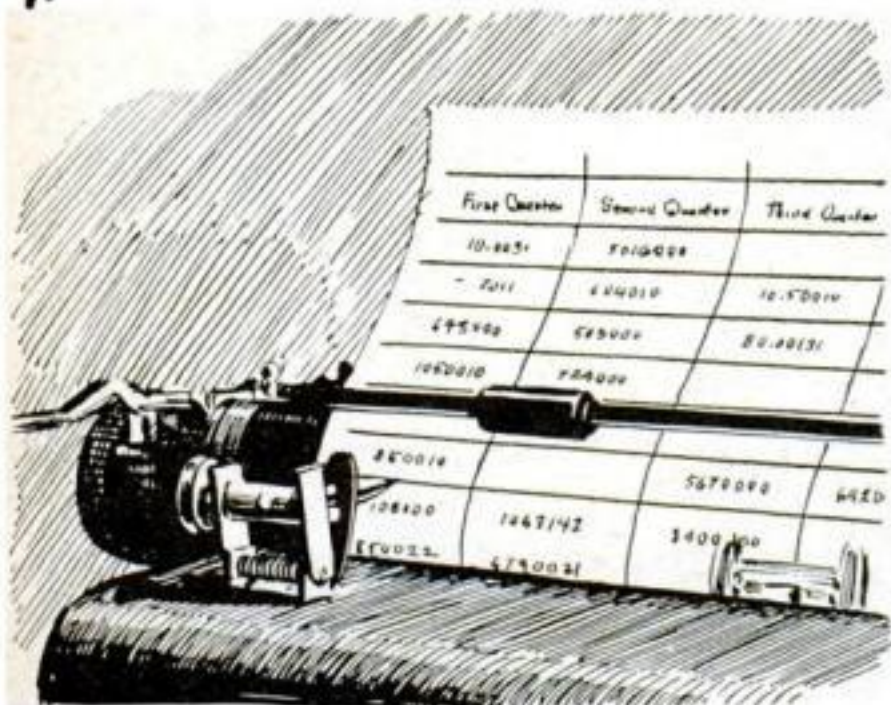


3 Specs to Cast Their Own Light. One person could read while another in the same room slept undisturbed if eyeglasses had built-in lights. These spectacle frames would support two small, adjustable-beam flashlights. A focusing arrangement would allow the user to pinpoint the rays or to diffuse them over a limited area.

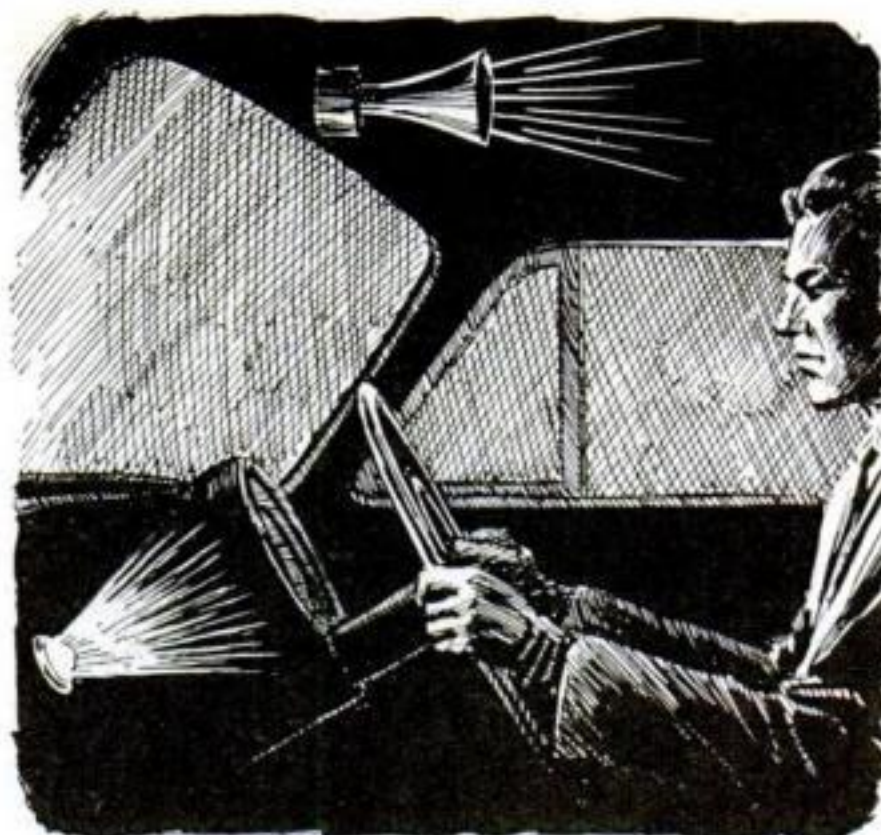
Please turn the page for more new ideas.

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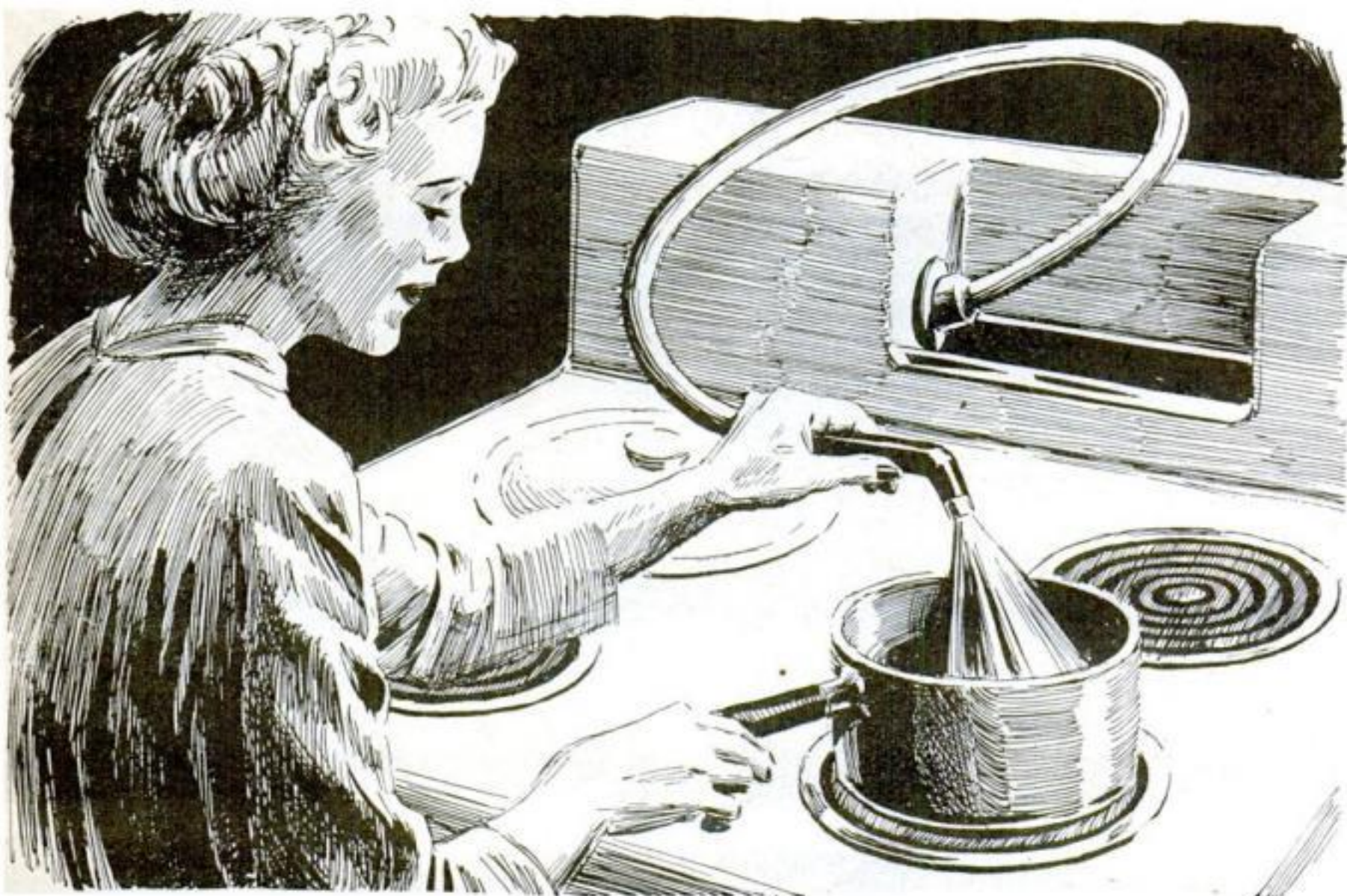
MORE New Ideas from the Inventors



4 Guide to Rule Typed Sheets. People who have to type charts, graphs and the like might find this typewriter attachment helpful. A spring clip mounted on the frame would hold a ball-point pen that could be moved up against the roller. By shifting the carriage or rolling the platen the typist could rule straight horizontal or vertical lines.



5 Alarm to Rouse Sleepy Driver. The ability to see out of the side of the eye, says this inventor, is the first thing a person loses when he starts to doze. To keep a driver alert, he would install a light on one side of the dash and time it to flash on periodically. If the driver failed to switch it off, he would be aroused by a horn.



6 Stove to Have Water Supply. A housewife would never have to lift pots off the stove to add water if her range had this handy faucet. A touch-control nozzle at the end of a flexible hose would reach to any

burner; springs would retract the hose into a space behind the splash panel. The hose would be connected to a supply of running water; the overflow could drain either into the kitchen plumbing or into a drip pan.



7 Scooter to Double as Sled. Interchangeable running gear would make this scooter an all-year plaything. The forks that hold the wheels and axles would serve also as retainers for a set of snow runners. The same pedal that braked the scooter by conventional wheel drag would be used to actuate a ground-drag spur on the sled.



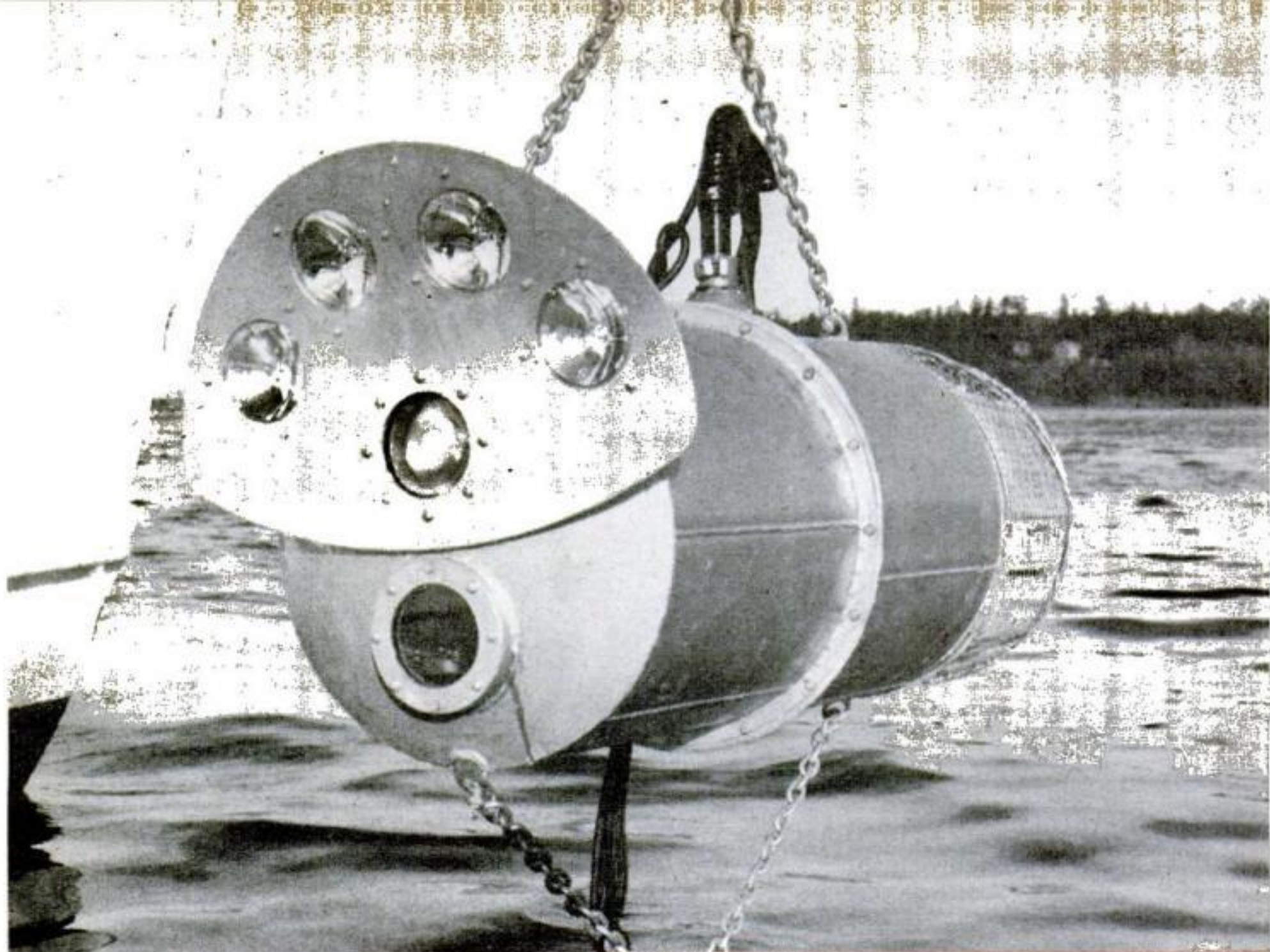
8 Magnets to Zip Zipper. There are times when opening or closing a slide fastener is like threading a needle on the run. This zipper would open at a pull and you wouldn't have to align ends to reseal the interlocking plastic strips. Magnetized particles in the flexible plastic would be arranged to make strips attract each other.



9 Air Ducts to Clear Runway Snow. One way of preventing ice from forming on airport runways is by blowing snow away as fast as it falls. This conduit beneath the center of the lane would aim blasts of compressed air over the road surface that would

push loose snow off to the margins. Air would be supplied by a central compressor aided, if necessary, by local boosters. The top or hood of the duct, which has to rise slightly above the surface, would be rubber, to yield under a plane's wheels.

U. S. patents on these inventions have been granted to: 1. Mary Jones, Louisville, Ky.; 2. Arthur Klein, Cincinnati; 3. Thomas Brady, Henderson City, Ky.; 4. Edward Mosher, Denver; 5. John Mathis, Pinckneyville, Ill.; 6. H. P. Zimmermann, Amityville, N. Y.; 7. John Cwynar and George Gelfand, Scranton, Pa.; 8. Robert Ellis, Bronx, N. Y.; 9. Assen Jordanoft, Brookville, N. Y.



TV camera is weighted enough to keep it from floating, not enough to let it hit bottom.

Self-Propelled TV Camera Spies on Fish

It could also locate sunken treasure and hidden reefs, say Canadian scientists.

AT WHAT depth a female trout laid her eggs in Canada's Lake Minnawanka used to be her own business. Then one day recently a short, tubular metal monster with five shining eyes came swimming along and caught her at it—80 feet below the surface.

The monster, a self-propelled TV camera invented by W. F. Torrington, was spying for the Canadian Wildlife Service. Since that day it has pried into the affairs of many other fish. It has also inspected underwater installations in harbors.

The National Research Council, for whom the inventor works, believes the camera will be a big help in salvage operations, in locating sunken treasure and submerged reefs, and—operating from midget submarines—in charting anti-invasion traps along enemy coasts.

The camera is mounted in a waterproof container equipped with spotlights. Electric propellers move the container backward and forward and swivel it. Gasoline generators supply current for camera and propellers.

Focusing and lighting are controlled from a boat, to which the wandering camera is tethered by a leash of 500-foot cables.—*Bill Bantey.*



CAMERA IS LAUNCHED in Lake Minnewanka, near Banff, from boat containing TV screens.

Cables are supported by occasional cedar floats to let the camera move about freely.

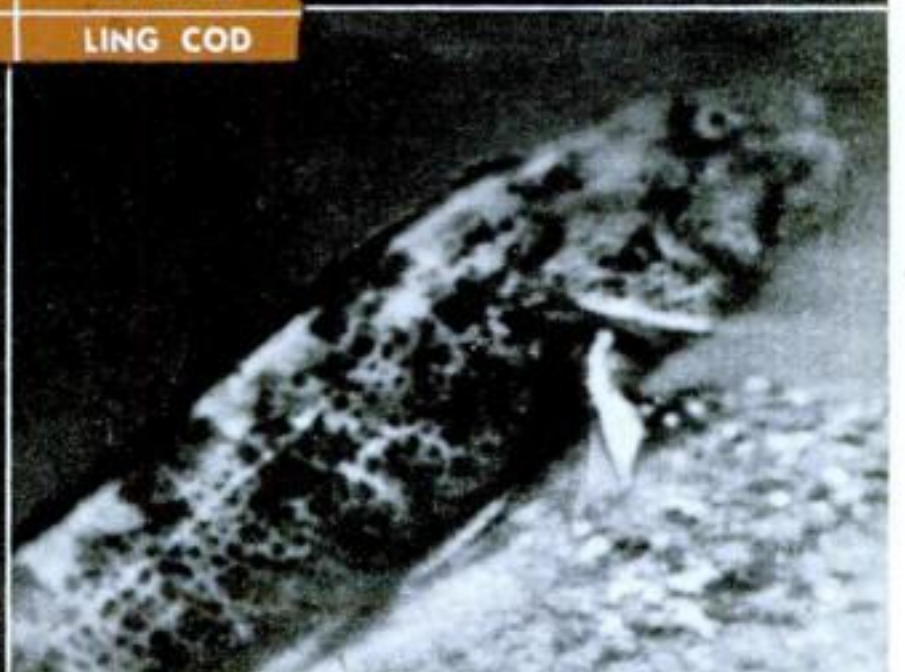
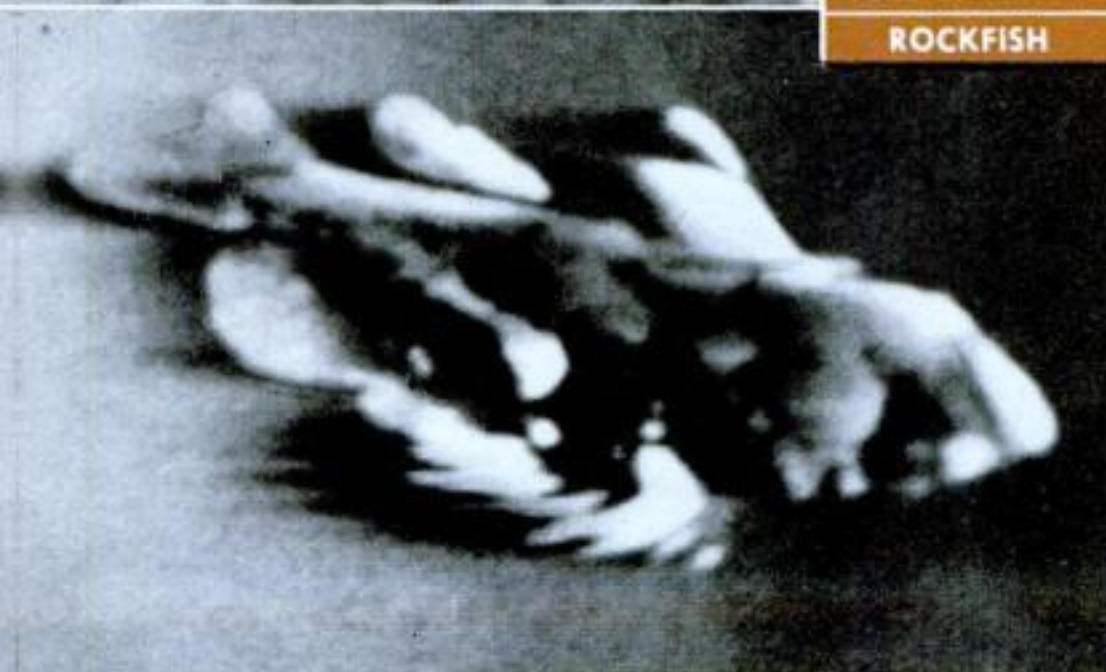
Dropping down for a look, the TV camera found most fish (below) simply loafing around.

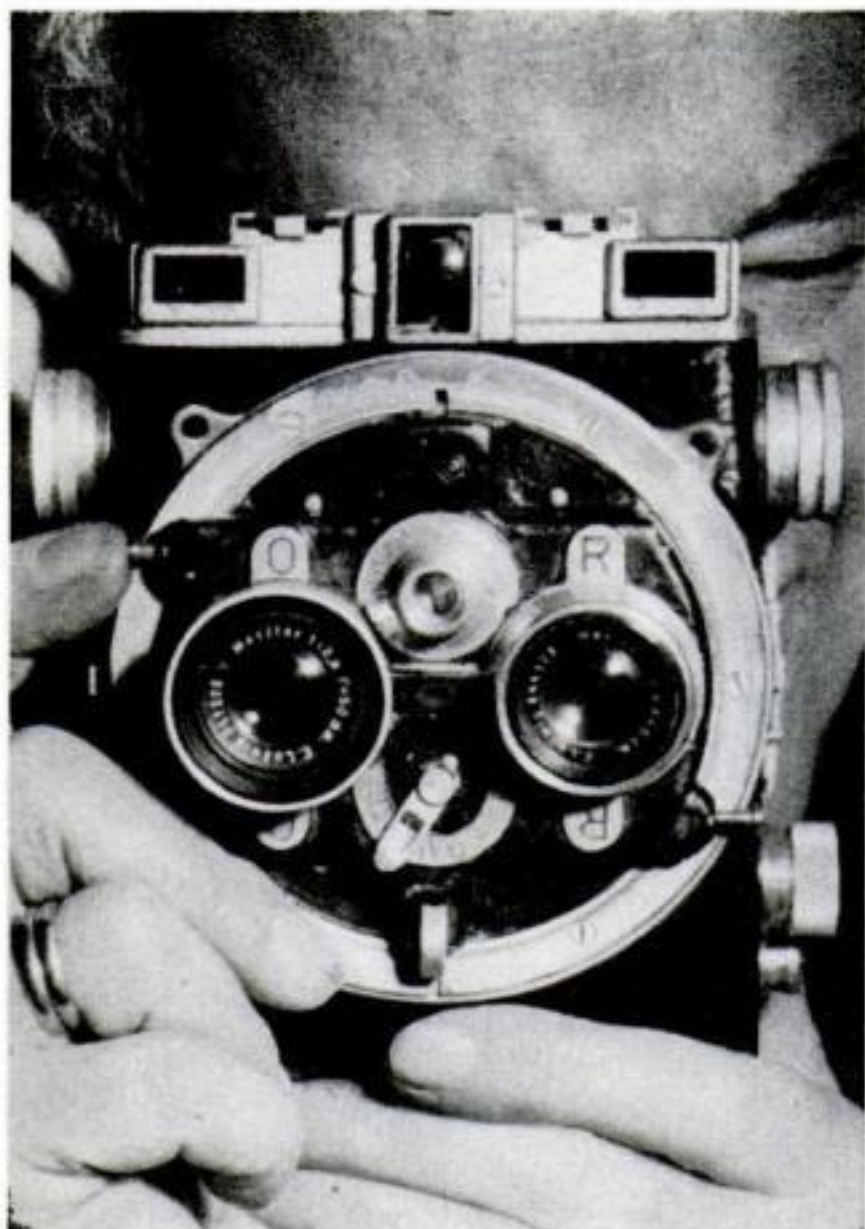


SUN STARFISH
ROCKFISH



RATFISH
LING COD





Choose Your Color and Shoot

THE fat German camera above has twin lenses, film compartments and shutter releases. You can load it simultaneously with black-and-white and color film and be prepared for any kind of shot. It sells for approximately \$200.



Latest Paris Styles—in Cars

A DESERT roadster, a plastic-body sports car made in Morocco and a super-slinky convertible marked the latest Paris auto show.

The big TAI Salmson at right has a light-metal body and what looks like a huge eye on the radiator.

The desert car is the tiny VDB (center), which can climb steep dunes and cover 500 miles of sand on 17 gallons of gas.

Africa's contribution to the road-racing fraternity is the plastic REAC (far right). Its top lifts off for competition.

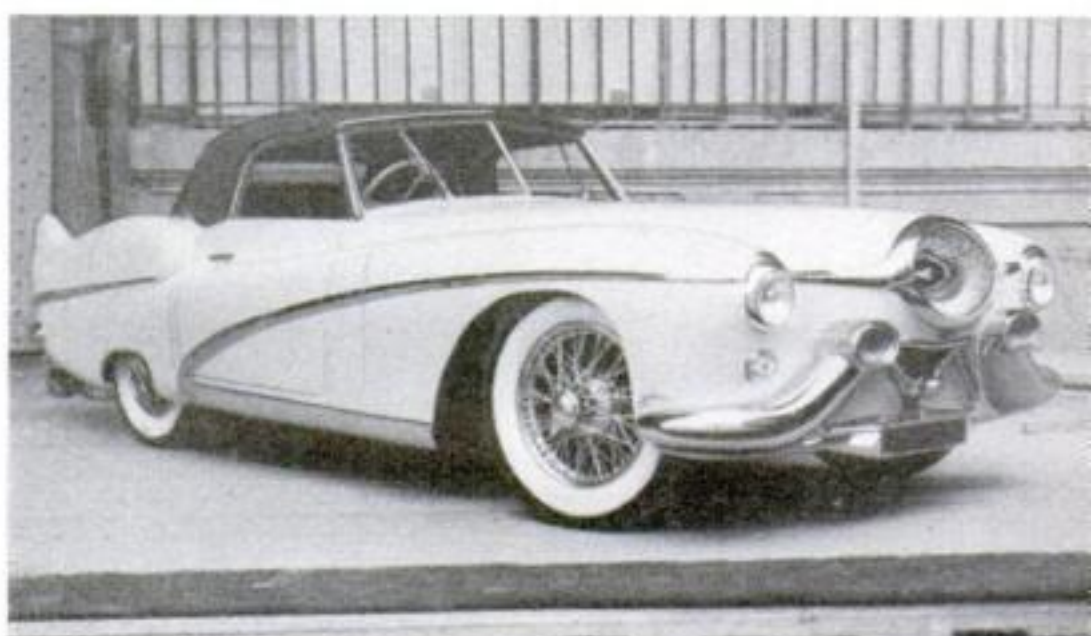


Midget Sub Joins U. S. Navy

GIVING orders by phone to an engineer below, Lieut. A. de Williencourt of the French Navy maneuvers into a San Diego dock one of two tiny submarines that France has lent to the U.S. Navy for observation and operational study.

Electronics Down on the Farm

ELECTRONICS engineers are following the plow in a Travelab (left) to design better farm machinery at lower cost. Electronic recorders and high-speed motion-picture cameras make stress-and-strain tests of equipment in the field. The Ford Tractor Division developed the motorized lab.



Powered Caravan Hitches No Rides

THIS German Volkswagen for campers travels under its own power. The driver sits over the front axle to leave plenty of space for housekeeping.

A couch running lengthwise in the rear opens to sleep two and a seat across the back can hold a child. Tucked just inside the open doors are a tiny sink and stove.



Mechanical Mule Joins Army

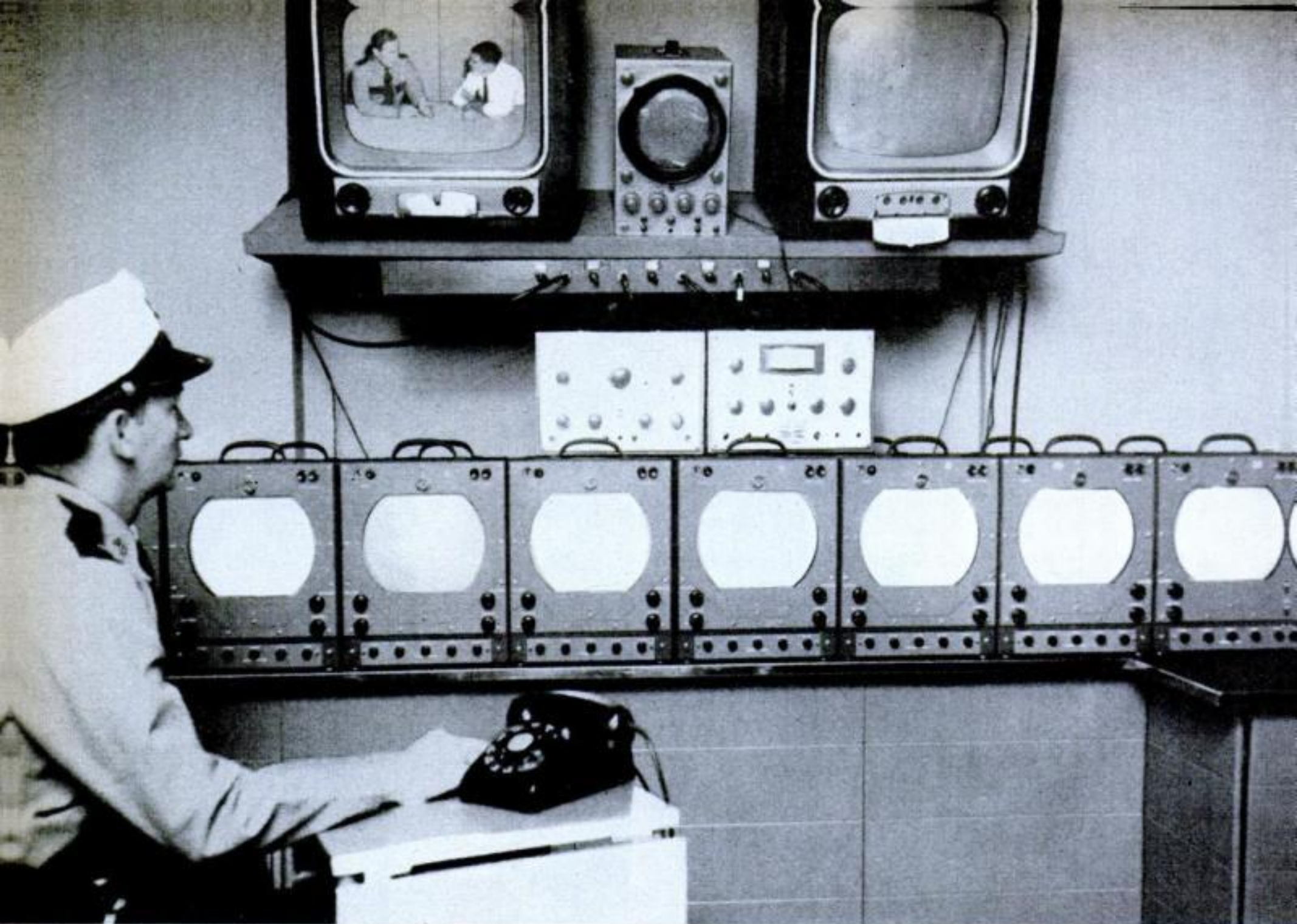
Just like a live mule, this new Army cargo carrier can be ridden or led. The controls are built low to the ground so that the driver can operate it while walking alongside. Four-wheel drive and four-wheel steering give it a mule's sure-footedness and maneuverability in rough terrain. It weighs only 740 pounds.



Plastic Cuts Trailer's Weight

YESSIR, there's a girl inside the 24-foot trailer above. The see-through panels are made of glass-fiber reinforced plastic. The weatherproof, corrosion-proof trailer will increase payload for truckers without exceeding over-the-road weight limits. The Seaboard Transportation Co., Antioch, Calif., makes the bodies.





Guard watches one of two TV receivers, above battery of monitors, to check up on prisoners.

TV-Eyes Guard New Houston Jail

IN HOUSTON when a jailer tells a prisoner that he's "going to keep an eye on him," he's not fooling. For Houston's new multimillion-dollar jail has \$45,000 worth of TV equipment—eight cameras and eight receivers—that helps police keep a 24-hour watch on their prisoners.

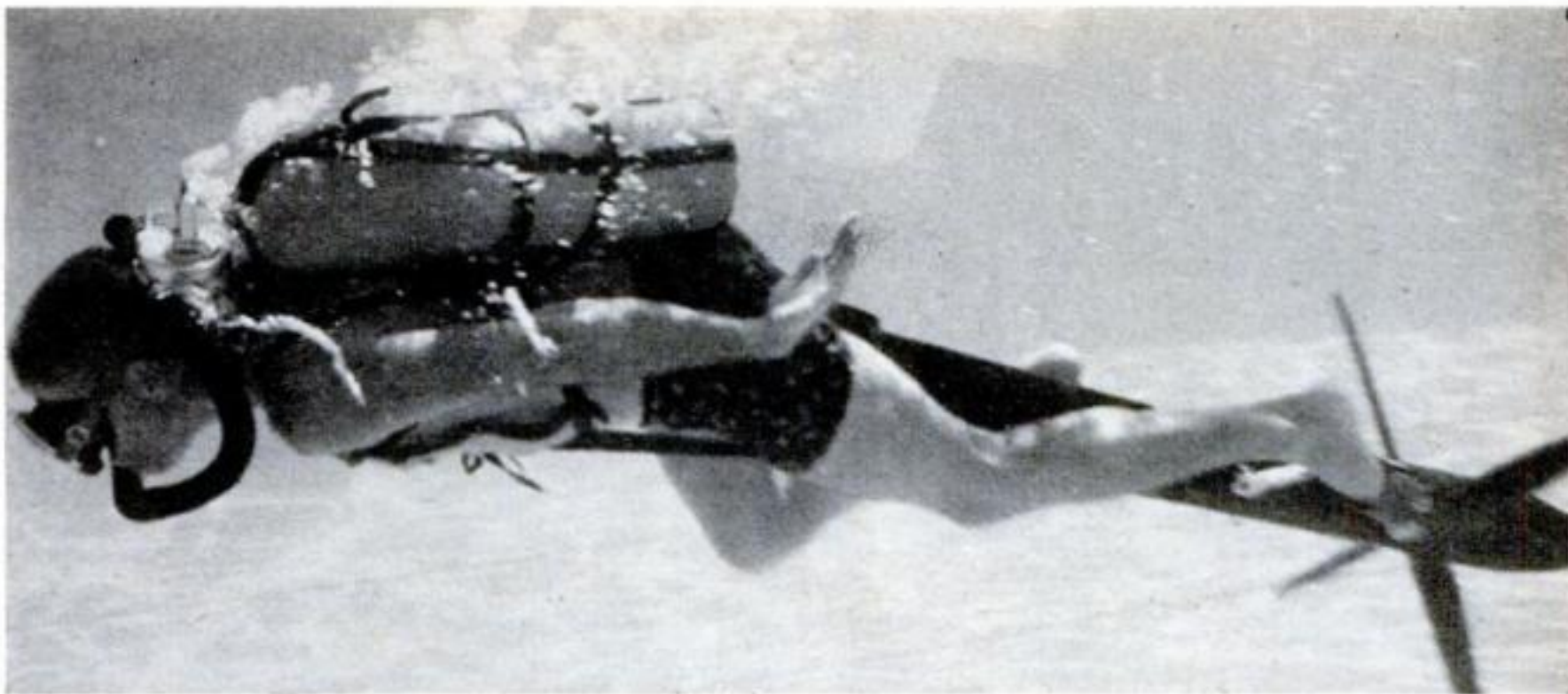
TV also lets the habitual prisoners, booked regularly, display a little "ham." One old repeater gives a song-and-dance routine every time he is in view.



GLASS-PROTECTED camera (in wall) is one of six snooping on prisoners' quarters. Others cover booking room and any cell needing special supervision. Here a guard talks with a reporter.



PORTABLE CAMERA can be located in corridor to let guards check on interviews being held behind those bars. Receivers—connected to cameras by wires—are located in key offices.



Underwater Bike Makes Swimmer a Human Submarine

A NAVY frogman figured swimming under water with an oxygen tank on his back would be a lot easier if he came equipped

with a propeller. That's when the Aquaped was born. The device is shown being demonstrated in a swimming pool at Las Vegas.



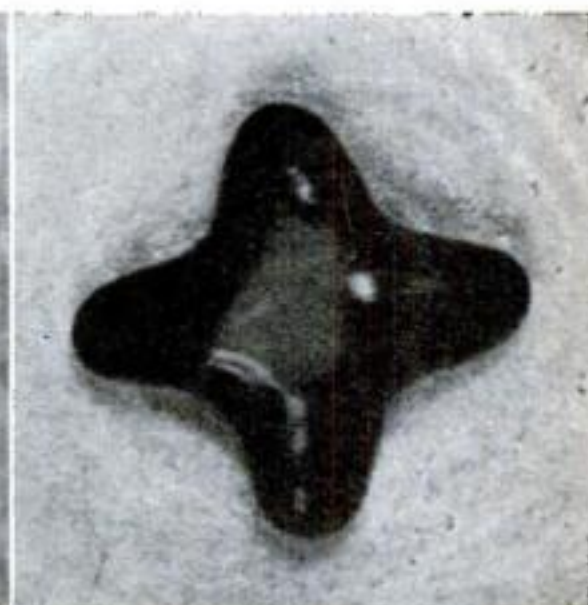
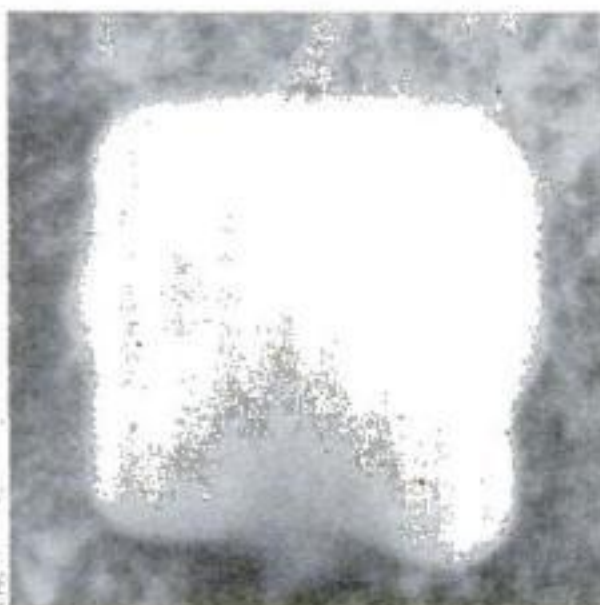
Flying Farmers Get Runway Kit

ANY meadow is an airport when a new landing-strip lighting unit is installed. You plow a furrow, drop in wire, drive stakes holding threshold and runway markers (left), and hook up cable. The Line Material Co., Milwaukee, makes the kit.



New Heel Slides On

TIME wasted getting his shoes re-heeled goaded an Englishman into this invention. A metal plate on the shoe allows replacement of a worn heel base with new layers of leather. You just slide in the retread.



Dancing Drops on a Hot Griddle Form Geometric Patterns

WHAT happens when a drop of water falls on a hot stove? It never hits the hot surface but floats on its own vapor, vibrating and making patterns like those above. Viewed stroboscopically, drops appear as sausage

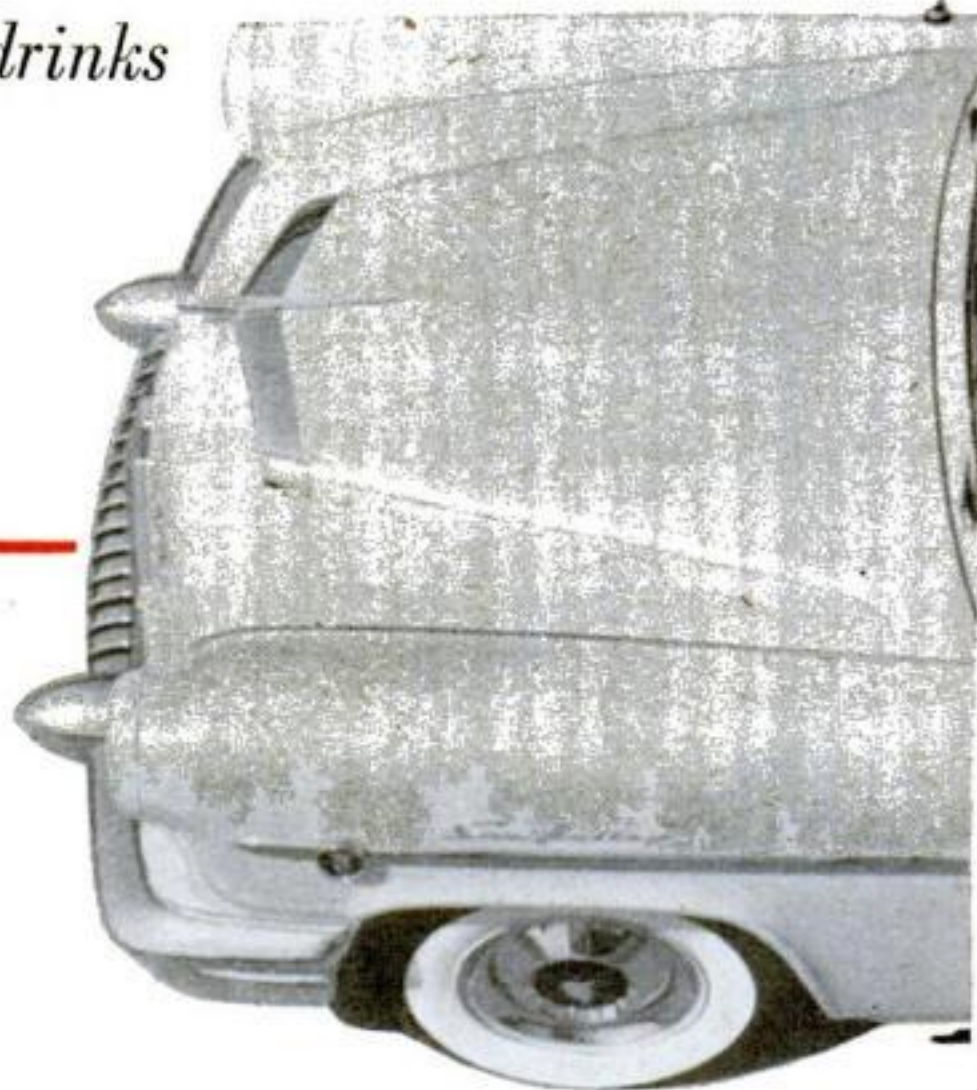
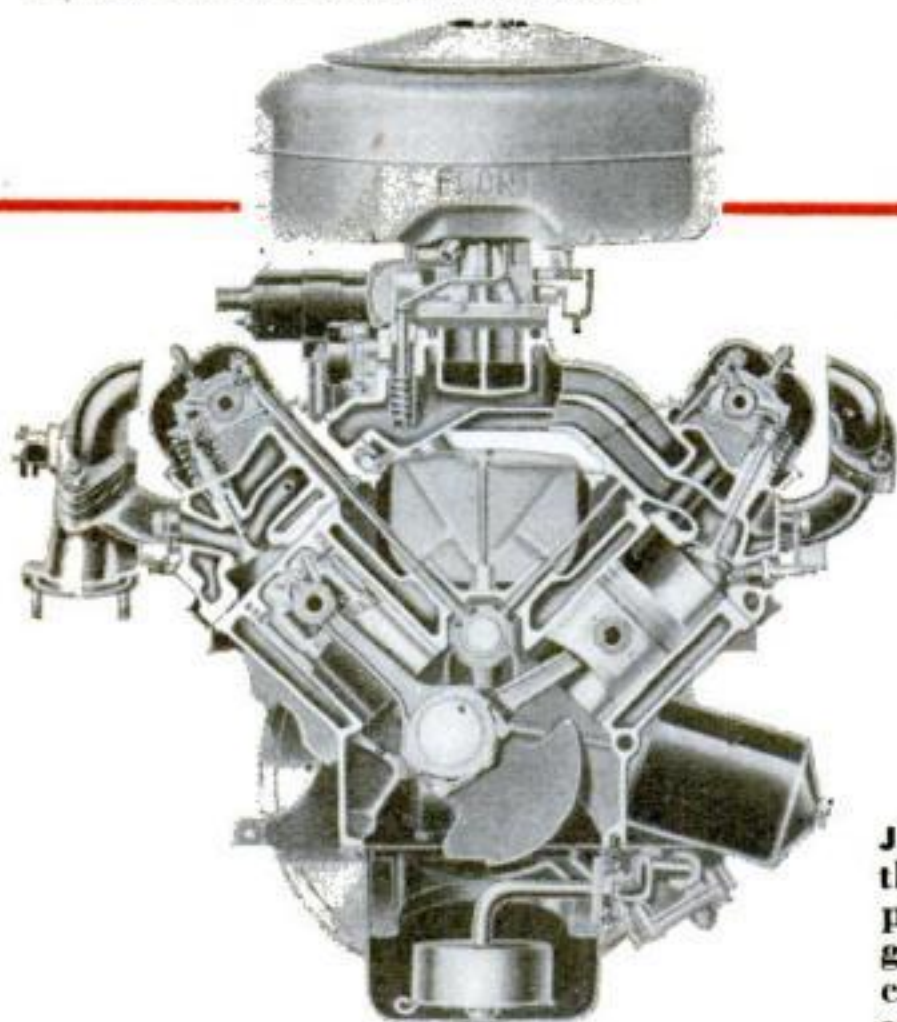
shapes, triangles, squares, pentagons and other geometric figures. The Holter Research Foundation at Helena, Mont., noted the phenomenon and made the photographs while working on another project.

Mercury Brings Out

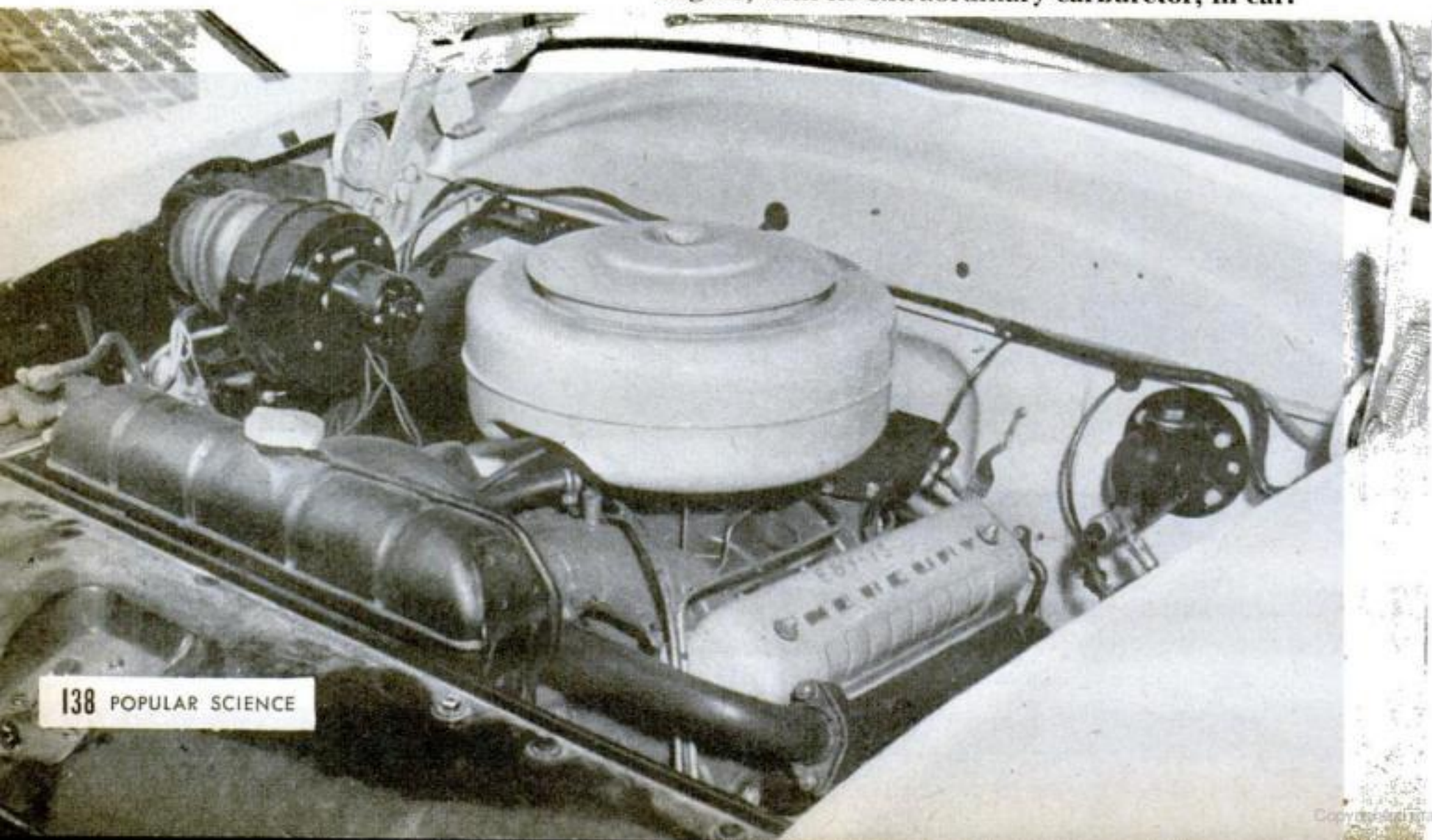
Its first new power plant in 15 years has a 161-hp. push, but drinks no more gas than before.

By Wilbur Shaw

PHOTOS AND COVER BY W. W. MORRIS



JAUNTY, WOT? Above is Sun Valley model of the 1954 Mercury line, with a tinted, half-plastic top. At left is a cutaway of the new engine that produces .628 horsepower for every cubic inch of displacement. Photo below shows engine, with its extraordinary carburetor, in car.



Valve-in-Head Engine



THREE years ago a Mercury engineer told me that the men in his department would never be satisfied until they designed an engine that ate up a lot less of its own power than the ones then on the production line.

Well, they've done it.

I was introduced the other day to the newest member of the Ford Motor Company's family of engines. It's the overhead-valve Mercury power plant for 1954, with 161 horsepower.

This isn't an engine that will beat everything else away from a light. It wasn't built for that. It was built for expending less energy on its own friction and more on push at the rear wheels.

Mercury's first new engine in 15 years, replacing the old L-head V-8, is a "family" engine because it adheres strictly to tested Ford Motor Company design. Announced last month, it's conventional in appearance, with a short stroke and a

high-turbulence head. It contains no tricky curlicues.

But look what it does:

In the old engine, the sheer friction forces inside of it ate up almost a third of the power it produced. In the new engine, more than four-fifths of the power produced goes out the back end of the crankshaft to the transmission.

In the old engine, each piston shuttled back and forth in its cylinder for 21 miles for each 100 miles on the road. With the new one, the same amount of piston travel will drive the car 129 miles.

Piston travel causes wear. It also costs gasoline.

Engine Gets 36 More Horses

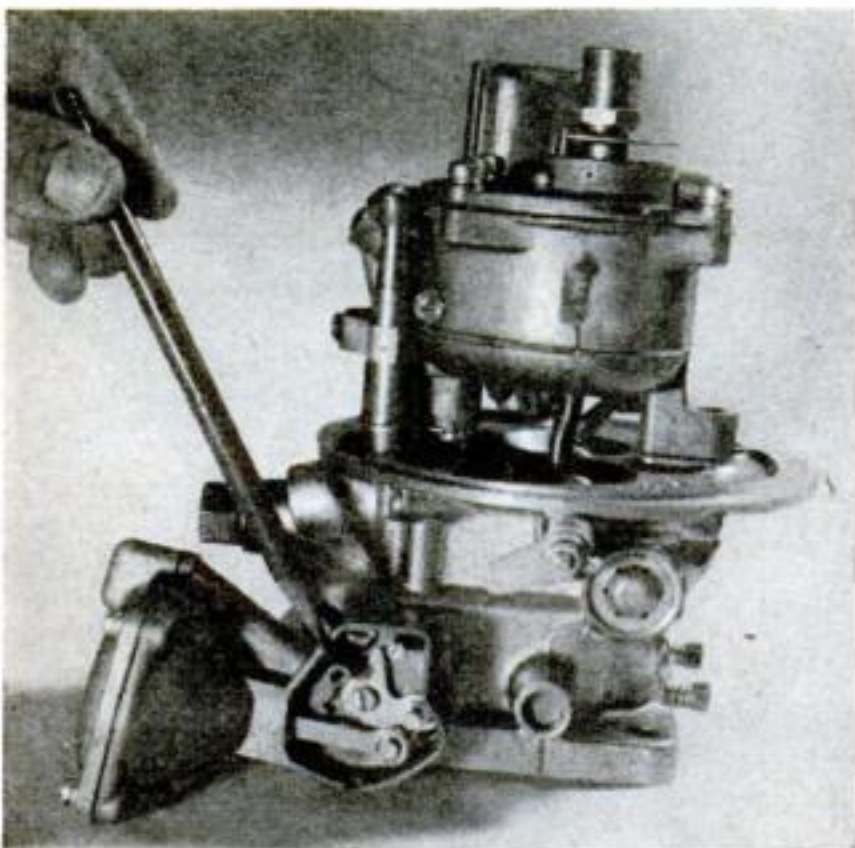
The old engine had 125 horsepower. The new one, at 161 hp., uses no more fuel than the power plant it replaces.

Don't underrate the acceleration performance, either. Last year's Mercury



WITH THE POWER BRAKES—introduced in mid-1953—the pedal travel is reduced from 6½

to 3½ inches. With power steering, parking requires only seven to 10 pounds' rim-pull.



THE HEART of the new carburetor is this linkage to the auxiliary barrels, operated by the diaphragm to the left of the pencil. The float bowl sits on heat-insulating stilts.

took 52 seconds to reach 80 miles an hour. This year's car: 34 seconds. Perhaps more important to safety on the highway, this year's car is five car-lengths ahead of the old one at 80 miles an hour when the automatic transmission is "kicked down" at 50 m.p.h. for passing.

More than the new engine has gone into the 1954 Mercury. A new carburetor is high on the list of improvements.

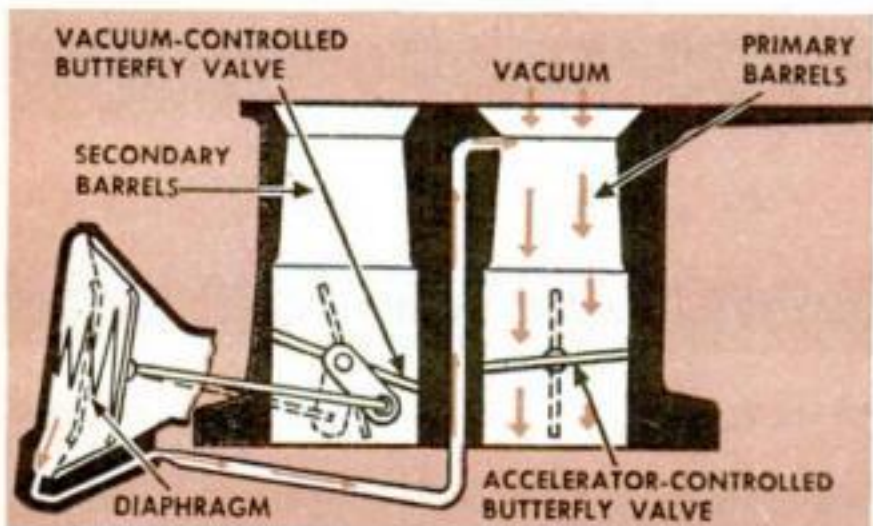
When I drove the car on the evergreen-screened Ford test track in Dearborn, Mich., and again on the Indianapolis Motor Speedway, I was struck by the smoothness of the power pickup as the accelerator went down. There was no transition point, no momentary flutter, no lurch as the car gained speed. The reason for it is the way the butterfly valves are opened in response to the demand for more torque at the rear wheels.

Engine Vacuum Opens Butterflies

In four-barrel carburetors (PSM, Mar. '52, p. 122), a means has to be provided for opening the secondary barrels when the engine needs more fuel. Some companies do it mechanically. Others do it with an air stream, induced by engine vacuum, that overcomes the pull of little counterweights on the butterflies.

Mercury uses engine vacuum, too, but in a different way.

As the butterflies on the two primary



THE ACCELERATOR PEDAL opens and closes only two of the carburetor's four butterfly valves. Vacuum controls the others. Sketch above shows how it's piped to the diaphragm.

barrels are opened by linkage from the accelerator, engine vacuum reaches up into the carburetor for more air. The vacuum relieves the air pressure on one side of a little spring-loaded diaphragm, auxiliary to the carburetor. In turn, this opens the butterflies on the two secondary barrels. When the vacuum drops, the butterflies close.

It's a neat way of tailoring the fuel supply precisely to the engine's needs—and it's a gas saver.

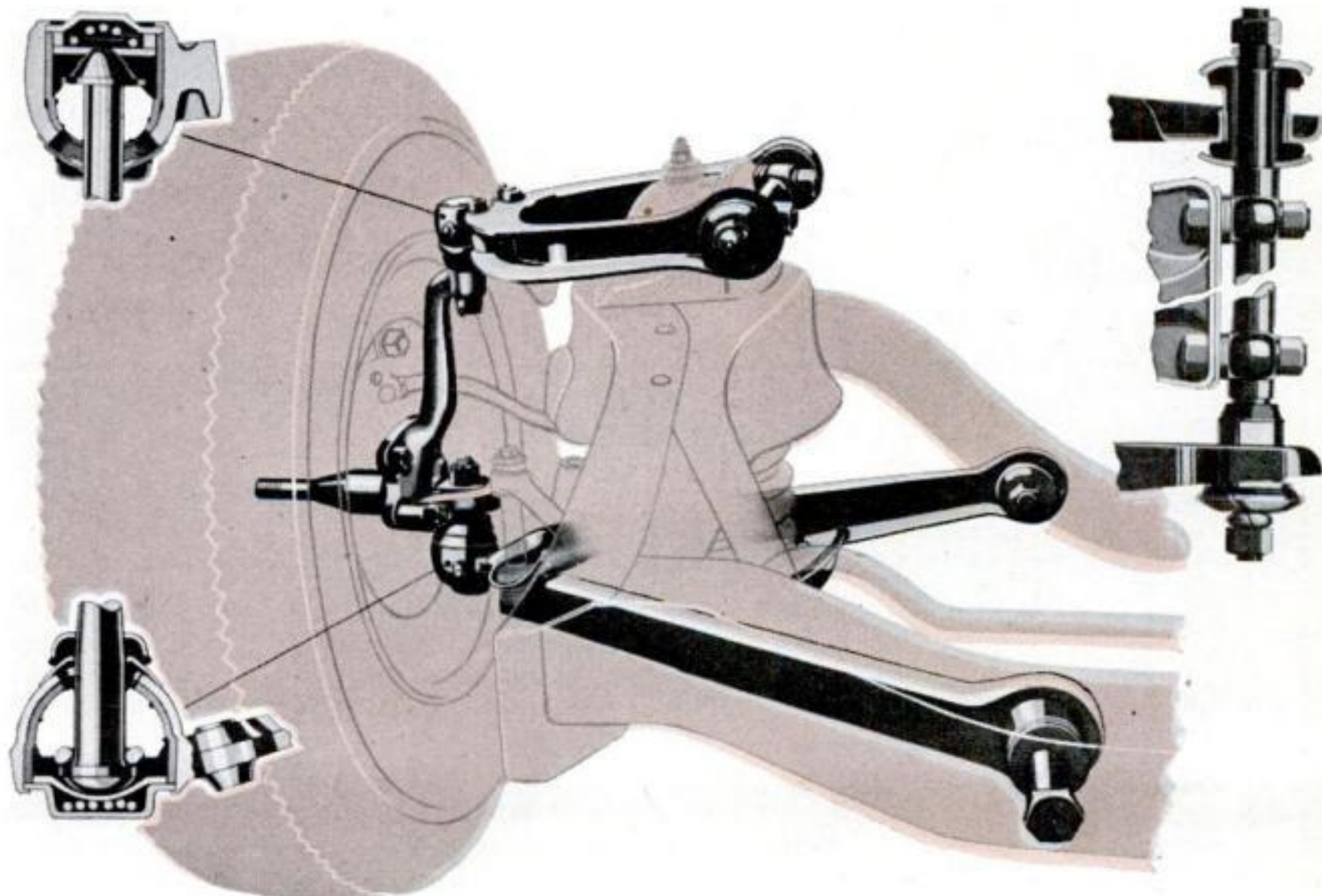
To tell the full truth, at low car speed the new carburetor will do more for the motorist with a manual transmission than for the man with automatic drive. To get a proper mixture, you've got to have a good air flow. For a good air flow, your engine has to rev up and pump faster. With Mercury's automatic transmission, the slippage at low car speed and hard throttle lets the engine rev up instantaneously. But when you hit the accelerator at low speed in a gearshift job, the straight-through mechanical connection between the engine and rear wheels holds down the r.p.m. and the air flow



BUMPERETTES ARE CANTED. Supported by not one, but two, horizontal members, they're designed to ride up on the rear bumper of the car ahead instead of locking.



SOME STYLING SLEIGHT OF HAND is evident here. The rear end of the '54 Mercury isn't any lower. It just looks that way. Over-all length is up 1½ inches and car is lighter.



THE NEW SUSPENSION uses a single forging, for upper and lower ball joints, in place of

the kingpin, spindle and spindle support. This advances oil pan for better cooling.



LINE OF THE NEW JOB are good. It had 600,000 miles of road test before introduction. In background you can see Indianapolis Speedway's new steel grandstand "A."



THE CAR WILL TOP 60 with an automatic transmission in 18 seconds, compared with 21 in '53. Behind it is the spot where I went over the wall in the 500-mile race in 1931.

—with the ordinary carburetor—until the car gradually picks up speed.

There's another little convenience built into this carburetor. If you stop at a roadside stand on a hot day you may have trouble getting your engine started again. That's because raw gas has boiled out of the float bowl into the manifold.

The '54 Mercury solves that one by putting an overflow tube on the bowl so the gas can boil away to the outside air.

The new engine is lower in the chassis—a by-product of a new front suspension. Mercury has the first ball-joint mountings for the front wheels in the medium-price field.

With ball joints you throw away the conventional spindles and kingpins. The ball joints are self-aligning. Up-and-down wheel travel is increased for a softer ride.

Ball joints wear less. They reduce the

steering effort. And instead of 16 places on the front suspension where your service-station man had to reach with a grease gun, now there are only four, exclusive of the tie rods. Everything else either is in rubber or is factory-lubricated.

Since the ball joints let the designers put the suspension-arm outer pivots closer to the wheel, the upper-arm inner pivots could be moved outboard. That increased the space in the engine compartment. So they lowered the engine.

Mercury will continue to offer power steering and power brakes and, for '54, air conditioning. They're also offering a model with a top that's half glass.

When the industry began manufacturing cars without center posts in 1950, they called them "hardtop convertibles." What will they call this new one—a transparent convertible?

END

FACTS ON '54 MERCURY

Model: Sun Valley hardtop.

Engine: V-8 valve-in-head; 161 hp. at 4,400 r.p.m.; compression ratio, 7.5:1; piston displacement, 256 cu. in.; piston travel (in feet per car mile at 20 m.p.h.), 1,380; bore and stroke, 3 $\frac{3}{8}$ " by 3 $\frac{7}{64}$ "; crankshaft bearing surface, 35.91 sq. in.; torque, 238 lb.-ft. at 2,200 to 2,800 r.p.m.

Weight: 3,434 lb. (approx.); per hp., 21.3 lb.

Transmission: Merc-O-Matic torque converter; rear-axle ratio, 3.54:1.

Steering ratio: 25.4:1; radius of turning circle, 20 $\frac{1}{2}$ '.

Effective brake-lining area: 159 sq. in.

Springs: front, coil; rear, semi-elliptic.

Outside dimensions: height, 60 $\frac{1}{2}$ "; overall length with bumpers and guards, 206 $\frac{13}{64}$ "; width, 74 $\frac{13}{32}$ "; wheelbase, 118"; overhang, front 36 $\frac{45}{64}$ ", rear 51 $\frac{1}{2}$ "; tread, front 58", rear 56".

Inside dimensions: seat-cushion width, front 58 $\frac{29}{32}$ ", rear 48 $\frac{1}{2}$ "; leg room, front 42 $\frac{13}{16}$ ", rear 38"; headroom, front 35 $\frac{13}{32}$ ", rear 34 $\frac{13}{64}$ "; seat height, front 13 $\frac{3}{8}$ ", rear 13 $\frac{1}{2}$ "; vertical distance, steering wheel to seat cushion with seat in rear position, 5 $\frac{1}{8}$ "; front-seat adjustment, horizontal 4 $\frac{1}{8}$ ", vertical 2 $\frac{1}{2}$ ".

Tire size: 7.10 by 15.

Ford-Merc's high-society cousin keeps horsepower at 205 while improving brakes, carburetor, fuel pump and suspension.



Lincoln Tones Up Performance for '54

ONE of America's fine cars may slip through the year-end fanfare of 1954 announcements with only a passing mention. There will be a good reason: amid a general boost in horsepowers, it has exactly the same as it had in '53.

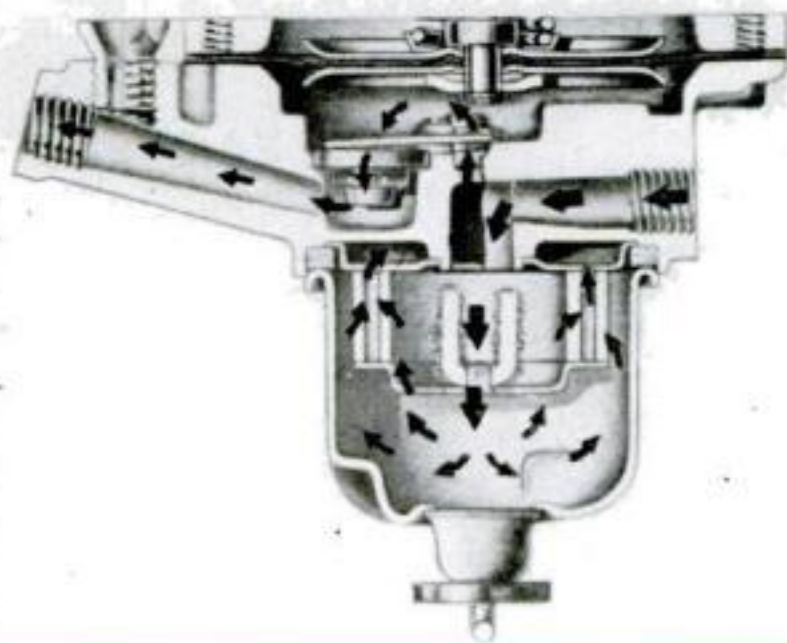
The Lincoln, a "sleeper," as they say out of the corners of their mouths at the pari-mutuel machines, still has 205 horsepower. It still rates among the best cars in low weight-per-horsepower. This year the designers have concentrated on making it a smoother automobile.

"You can put in a lot more power," ex-

plained a Lincoln engineer, "or you can refine what you've got. You can't do both in the same year."

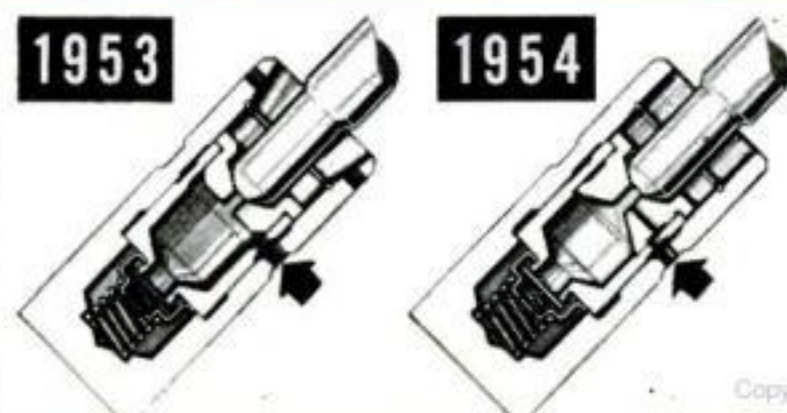
Changes have been made. The brakes

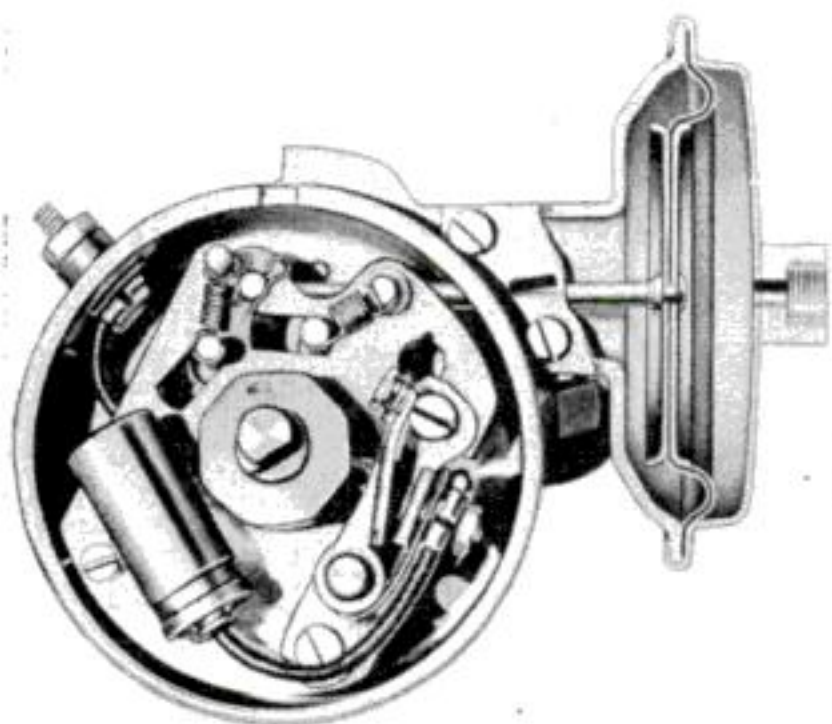
MAGNET in fuel pump keeps small metal particles from reaching and scoring engine. Combined with filter in fuel tank, it insures longer piston and cylinder life.



HIGHER OIL LEVEL in reservoirs of hydraulic tappets eliminates clicking noises when engine is cold. Note height of tappet inlet hole for '54 compared with '53 (arrows).

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BOOST IN SIZE of vacuum diaphragm that responds to intake manifold pressure improves spark timing. Supplementing mechanical linkage, it gives big advance for take-off.

are bigger. At 50 miles an hour the car can be stopped in six and a half car-lengths less than last year for any given pedal pressure. At 70, it's eight car-lengths less.

Like the Mercury (see p. 138), the Lincoln has an improved four-barrel carburetor. The spark advance has been attuned more precisely to the demand for push at the rear wheels. A sediment filter, good for the life of the car, is installed in the gas tank. A magnet in the fuel pump picks up any microscopic bits of metal before they can reach the engine.

The carburetor linkage has been al-

tered for smoother acceleration. The engine mounts are changed so that engine vibration won't set up sympathetic rattling in other parts of the car.

That's a tidy design feat in itself. Mountings must offset vibration at 400 to 425 r. p. m. That's the minimum number of revolutions permissible to take care of engine cooling, power steering, the transmission pump, generator output and even air conditioning.

The immediate predecessor of this engine, by the way, finished one-two-three-four in the 1952 Mexican Road Race and was first in its class in the 1953 Mobilgas Economy Run.

Reinforcements make the front-end sheet metal and the steering column more rigid on bumpy roads. The ball-joint suspension on the front wheels has been touched up.

The Lincoln continues to understeer. The company believes that a car should be built so that it has to be held in a turn. It considers oversteer—the anxiety of the front wheels to lead into a turn with only light steering-wheel pressure—dangerous.

For '54 the performance remains excellent. In Drive 3 Hydra-Matic position, it accelerates from a standing start to 60 miles an hour in 12.8 seconds. It will go from zero to 80 in Drive 3 in 21.6 seconds, and in Drive 4 in 22.9 seconds. For passing, it accelerates from 50 to 70 miles an hour in 8.6 seconds.

FACTS ON '54 LINCOLN

Model: Lincoln convertible.

Engine: V-8 overhead valve; 205 hp. at 4,000 r.p.m.; compression ratio, 8:1; piston displacement, 317.5 cu. in.; piston travel (in feet per car mile at 20 m.p.h.), 1,379; bore and stroke, 3.8" by 3.5"; crankshaft bearing surface, 43.49 sq. in.; torque, 305 lb.-ft. at 2,300-3,000 r.p.m.

Weight: (shipping) 4,310 lb.; per hp., 21 lb.

Transmission: Hydra-Matic; rear-axle ratio, 3.31:1.

Steering ratio: 26:1 manual; 21.3:1 power; radius of turning circle, 22.7'.

Effective brake-lining area: 220 sq. in.

Springs: front, ball-joint individual coil; rear, semi-elliptic.

Outside dimensions: over-all height, 63.1"; over-all length with bumpers and guards, 214.8"; width, 77.4"; wheelbase, 123"; overhang, front 37.5"; rear 54.3"; tread, front and rear, 58.5".

Inside dimensions: seat-cushion width, front 62.3", rear 59.7"; leg room, front 44.3", rear 38.1"; seat height, front 13.5", rear 12.5"; vertical distance, steering wheel to seat cushion with seat in mid-position, 4.9"; front-seat adjustment (power), horizontal 4.3", vertical 1.5".

Tire size: 8.20 by 15.



Diesel Bike Engine Goes to Sea as an Outboard Power Plant

A MARINE conversion kit puts the Lohmann diesel bike engine (PSM, Dec. '53, p. 81) on the water. Available only abroad, the kit includes a mounting bar, a round fuel tank, propeller and shaft, and rope-

starter pulley. Fuel pellets are burned in a shield clamped to the cylinder to heat the engine for rope starting. Made for European boats, which have tillers, the engine mount itself affords no means of steering.



Tool Fells Trees Hydraulically

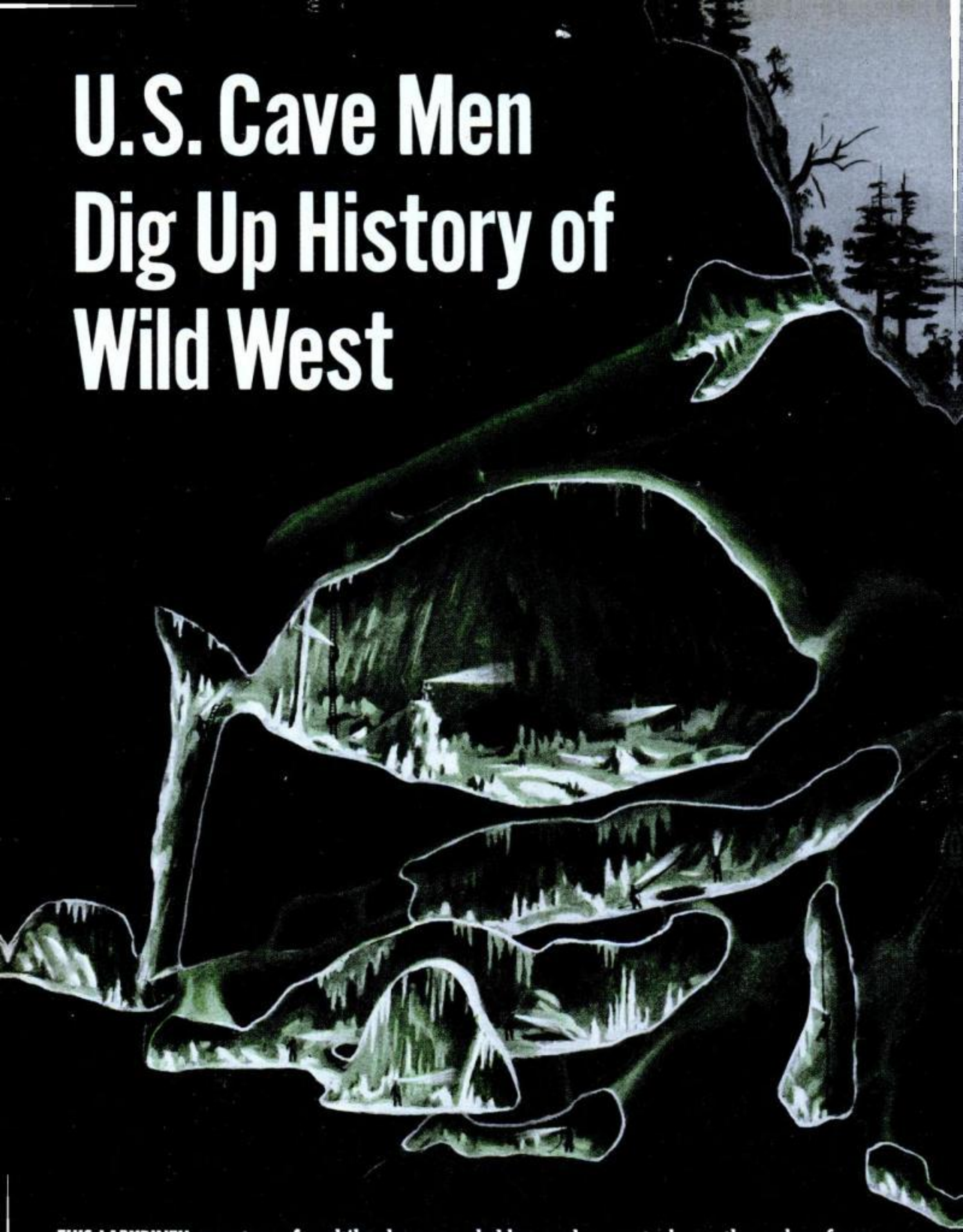
IT USED to take a husky lumberjack to pound a wedge into a half-chopped tree. Now the tool above provides the muscle. A little hydraulic pump pushes a wedge into the kerf, toppling the tree with a 90,000-pound lift. The Hufford Machine Works, El Segundo, Calif., manufacturer of the Hydra-Wedge, says it is safer, too.



Highway Turns on the Heat

SNOW will melt and ice will never form on ramps leading up to Boston's \$25,000,000 Aerial Highway. A pump and a steam-fed heat exchanger at each ramp will circulate hot water mixed with antifreeze through iron pipe embedded in the concrete. More than 200 tons of pipe will warm about 161,000 square feet of pavement.

U.S. Cave Men Dig Up History of Wild West



THIS LABYRINTH, a system of multilevel caves, has its opening in the side of a mountain rising from Lake Shasta, Calif. Called Stone Man, the caverns go 220 feet deep into the earth. Speleologists exploring them must use

ladders and ropes to lower themselves from one level to the other. On a walk — often a crawl — through the passages you would cover 1,200 feet. Explorers wear miner's lamps to light their way.

Scientists are discovering the dusty remains of people and animals hundreds of centuries old.

By Andrew R. Boone

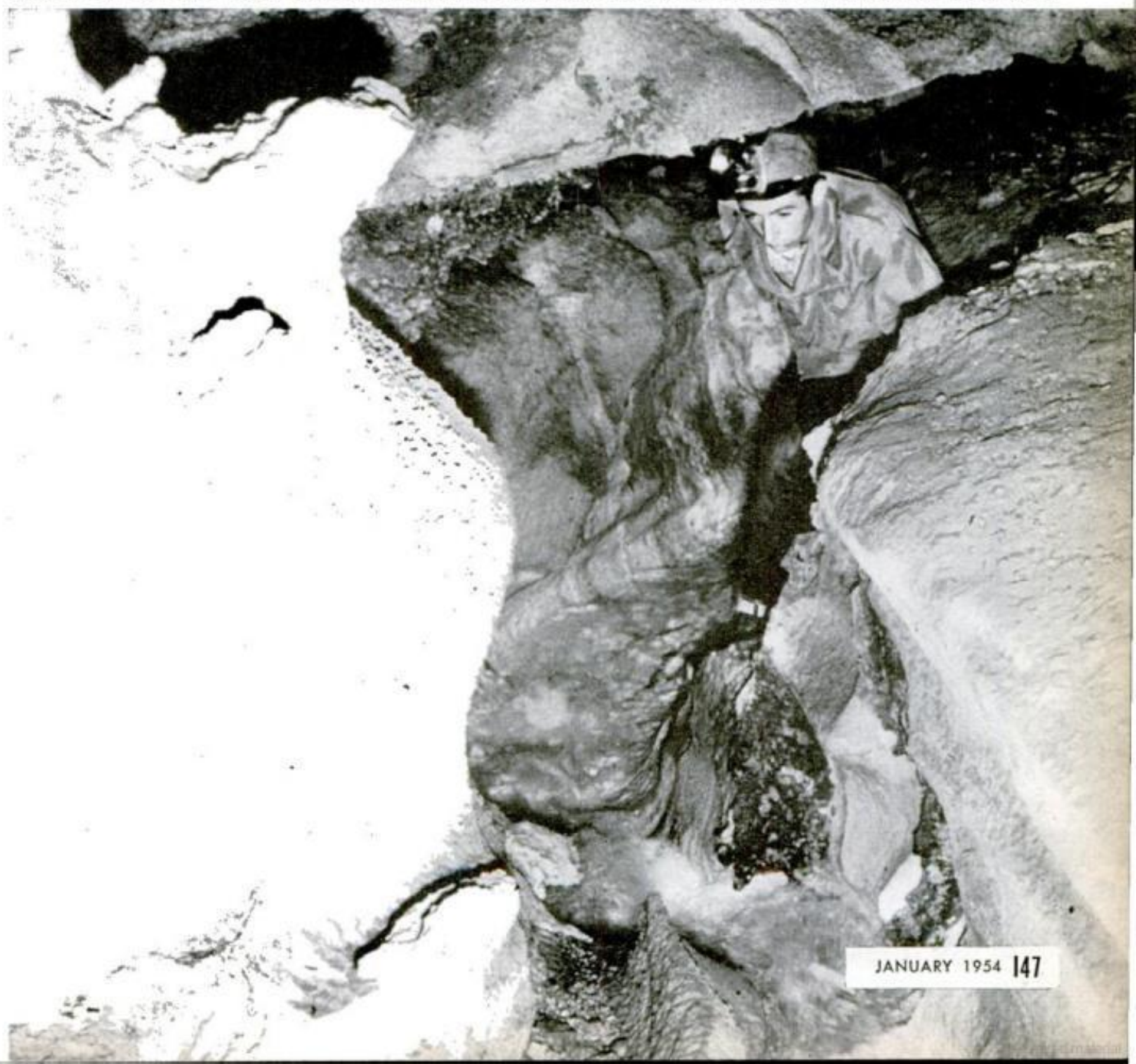
WHAT life was like hundreds of centuries ago in California, Nevada and Arizona is being found out, bit by bit, in the dust of dozens of caves in that part of the U.S.

The discoverers are a group of young men who are probing into the past with homemade scoop shovels, fine whisk brooms, jeep-drawn drags, giant vacuum cleaners and electric hammers. They are called speleologists—scientific underground explorers. The amateur variety of the same species is called a spelunker.

The speleologists are devoting themselves to



Channel in limestone cave below is deepened by chemical action of vegetable matter and water.





Map-making machine, in use at left, is a combination plane table and artillery gun spotter.

mapping, exploring and conserving all known caves in the three states, and finding new ones when they can. They have already added considerably to man's knowledge of the underground. Also, because ancient peoples and animals, careless or inquisitive, jumped or fell into these holes in the earth long

centuries ago and ended their days there, the speleologists have found out a lot about what went on above ground.

Already they have discovered the remains of prehistoric men, horses and camels lying together, thus proving for the first time that they lived at the same time and in the same place. They have

Relics Reveal Centuries-Old Secrets



SPELEOLOGISTS above examine the dry bed of Lake Lahontan, Nevada, for trophies of the past. A portable gas engine powers fan that sucks dust from the pit.



WELL-PRESERVED willow baskets, found under 30 inches of debris, are carefully dusted off. They were made by unknown Indians, perhaps 100 centuries ago.



HUMAN THighbONE (arrow) is shown embedded in 3½ inches of cave deposit in Moaning Cave, Calif. Bone's age, figured by counting rings of deposit, is 2,494 years.



FINGER POINTS to drip in ancient stalactite formation, in Cave of Skulls, Calif., that took 98 years to form. Parent formation was broken off by vandals in 1853.

also unearthed ample proof that the far westerners of 10,000 to 30,000 years ago were not as primitive as they had previously been thought to be.

They have found the fossil remains of a rare ground sloth that lived in caves

while the last glaciers were melting.

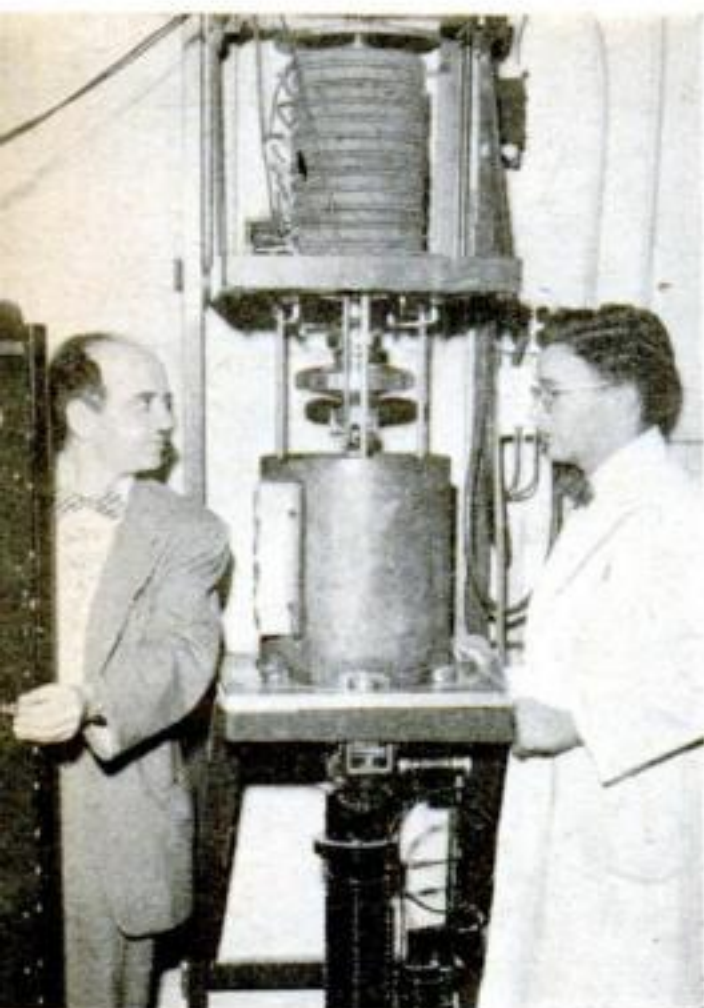
Moreover, the speleologists have come across the bones of two prehistoric citizens who stood six feet four in their bare feet. Westerners evidently were running tall even in those faraway days. **END**



UNDER THE BASKETS, scientist finds a cedar-bark robe, then the skull of an average-size mummy. The robe was used as a burial shroud in ancient days.

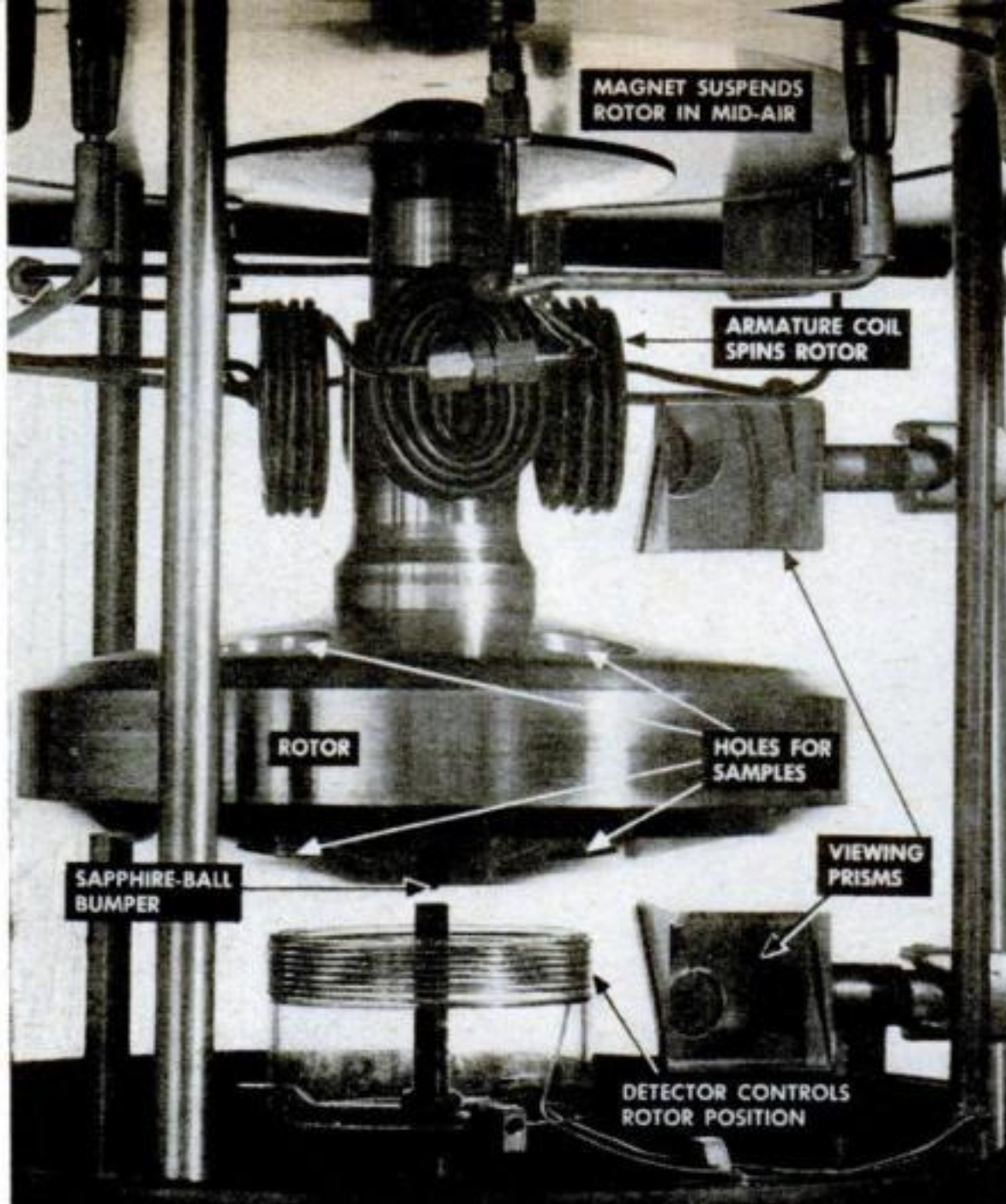


ON LAKE SHORE near the diggings, speleologist gives a whisk-broom brush-off to the remains of an adult female mummy. It is one of the oldest found in U.S. to date.



Scientific Top Can Spin for Seven Months

THERE'S no visible means of support for this scientific top, the world's largest ultra-centrifuge. An electromagnet suspends it in mid-air (really in a vacuum), and a varying magnetic field spins it at 30,000 r.p.m.,

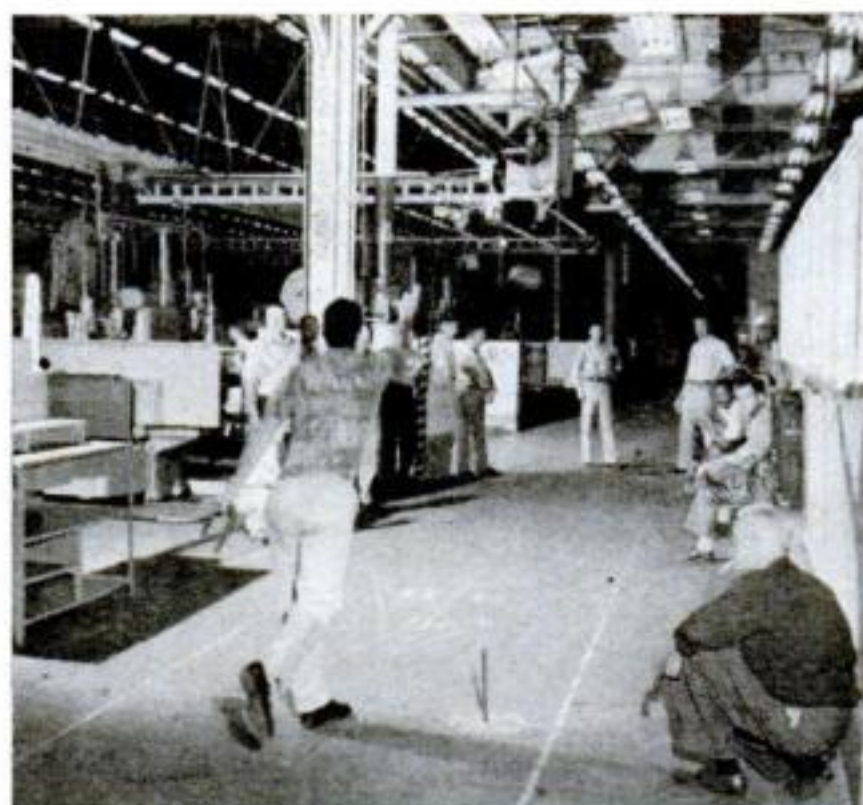


creating a centrifugal force 100,000 times gravity pull. Made at the University of Southern California for research on molecules, it would take 208 days to stop spinning if not braked.



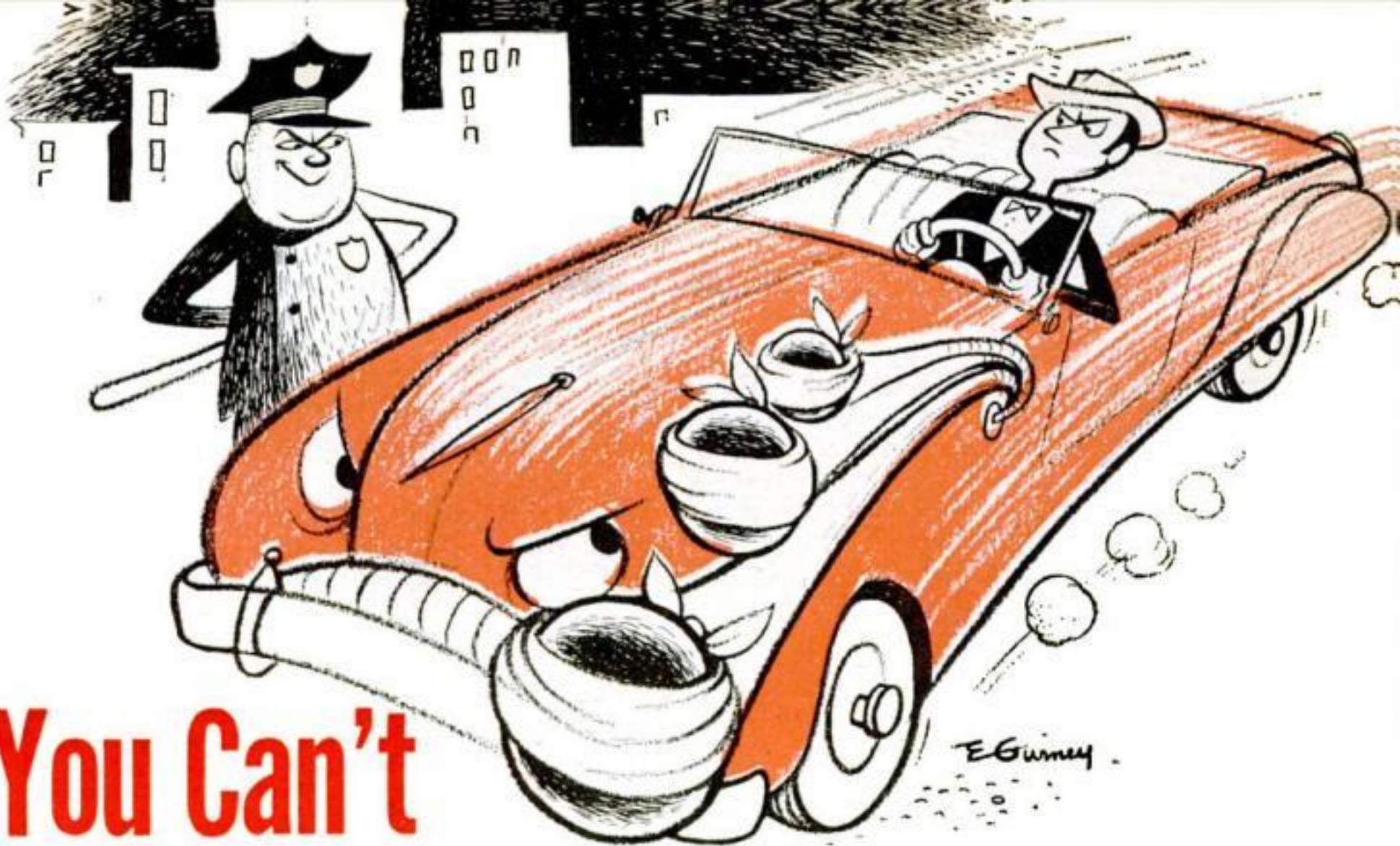
That Spare's for Kangaroos

A KANGAROO catcher was added to this stock car for the 6,500-mile trip in an Australian road reliability test run. The car above has a spare tire taped at the front to gently bounce the animals from the road. Wire mesh guards protect the headlights.



Factory Becomes Playground

AT THE noon lunch break, plane builders at North American break out the recreation equipment for a daily workout. Cleared blueprint desks become table tennis courts and assembly-line aisles turn into shuffleboard and horseshoe-pitching areas.



You Can't Blow Your Horn in Memphis



By Robert Lasch

THE bullfrog is a respected creature of the South, but when one unleashed its mellow baritone within the city limits of Memphis, it tangled with the law.

Bullfrogs are not allowed to croak in Memphis, dogs are forbidden to bark, and auto horns to beep, except in case of emergency. The law, which first laid down these bans 15 years ago, is the Tennessee metropolis' famed noise-abatement ordinance.

Memphis has proved conclusively that at least some of the nerve-racking, ulcer-incubating sounds that result when thousands of people live and work together are unnecessary. For 11 straight years the mid-South capital on the banks

Not only cars are muffled, but even dogs and bullfrogs, in America's quietest city.

of the Mississippi has won the top award for municipal silence granted by the Noise Abatement Council as "the nation's quietest city."

How quiet is Memphis? Your correspondent went there to find out—and it is really quiet. The yawp of an auto horn is so rare that you notice it. On a busy Monday, with Main Street crowded and the cotton merchants thronging Front Street, I heard an auto horn just three times in 12 hours; twice the offender was an out-of-state car or truck.

Heavy traffic moved smoothly along





MOTORISTS entering Memphis get briefed on antinoise ordinance at city limits. In the

photo above, police are shown stopping cars on Mississippi River bridge.

downtown streets with an unnatural hush. The horses of the mounted traffic policemen softly picked their way on rubber horseshoes.

In Court Square and Confederate Park, overlooking Wolf River at its junction with the majestic Mississippi, people walked and talked in a subdued and leisurely way that matched the generally unfrantic pace of the city as a whole. Measured by sound, Memphis seems like a town of 15,000 rather than a fast-growing city of 432,000.

Cops Clamp Down on Croaking Frog

So it was easy to understand how, in one of the notable cases under the antinoise ordinance, a nature lover had been fined because the bullfrog he brought back from a fishing trip tuned up on a moonlit night to the discontent of the neighbors.

After eight p.m., Memphis is as quiet, practically speaking, as the grave. People there value what the antinoise ordinance feelingly describes as their "quiet, comfort and repose."

To protect this quiet, comfort and repose, the ordinance bans all "loud, disturbing and unnecessary noises." And it spells out what it means: Auto horns, except to prevent an accident. Blaring

radios. Yelling, shouting, hooting, whistling or singing. Animals, birds or fowls given to frequent or long continued noise. Unmuffled exhausts. Train whistles, except briefly at a grade crossing. Industrial clatter. Off-hours construction activity. Commercial sound trucks. And so on and on.

Well-Rested Tourists Are Impressed

Memphis citizens firmly believe that they are healthier because of the hush in their communal life. They are certain that, whatever the physical results, they enjoy more peace of mind. As proof that they have attained something of genuine value, they point to the long line of tourists passing through who, after a silent night of deep sleep, have written their thanks to Memphis officials while simultaneously chewing out their town fathers at home for not doing as well.

Memphis believes, too, that putting the silencer on urban clamor yields incidental benefits that are not to be sneezed at.

The police love to tell about three fugitives from San Quentin prison who blew into Memphis after staging a series of bank robberies in Mississippi. The exhilarated thugs noted a couple of pretty girls on a downtown street and



MOUNTED COP climbs down to give bus driver "quiet" warning. Clop-clop of horses' hooves

is outlawed, too: police department steeds wear rubber shoes.

gave them the time-honored salutation—a long blast on the horn of their car, accompanied by leers, whistles and arm wavings.

Two cops walked across the street, intending to remind the visitors of the antinoise ordinance. The thugs took fright, drew guns and tried a getaway, but Memphis' finest clapped them into jail and ultimately dispatched them back to San Quentin.

Then there was the time when a police inspector on his way home to dinner met up with a motorist who was furiously blasting his horn. The inspector stopped this offender, who contended that he was merely sending a message in Morse code. One thing led to another, and the upshot was the discovery of an expensive counterfeiting layout in the man's room, all set to pour out a flood of phony five-dollar bills.

Editor Started Campaign

But, handy as it is, catching stick-up men and funny-money artists is not really the business of the antinoise law. Its business is silence, and it began with the ruminations of an editor, Ralph Millett of the Memphis *Press-Scimitar*. Millett had been put on the mailing list of a national antinoise organization. He was

something of a crank on the subject. Observing that noise is local, he began to bear down, in print and in private conversation, on city officials.

A battle of sound trucks gave impetus to Millett's campaign. One day six of these vehicles, representing competing retailers, met at a downtown corner. Each being unwilling to yield the right of way to the others, they proceeded to step up their amplifiers in a grueling contest to drown each other out. The



ANTIRACKET PLACARD decorates police prowler during Noise Abatement Week. If warning doesn't work, long arm of law muffles noisy offenders with stiff fines.

Everybody Helps Say "Sh!"



WINDOW DISPLAY sounds off at motorists who blast Memphis' churchyard calm.



INDUSTRY-SPONSORED billboard reminds passers-by of healthful effects of quiet.



STERN MANIKINS in store window symbolize dim view cops take of unwarranted racket.

citizenry clapped hands over ears and screamed for quiet.

So Police Commissioner Joe Boyle decided to sponsor an antinoise ordinance.

According to Boyle, who is now Finance Commissioner, the secret of Memphis' success lies in steady, unrelenting enforcement. He scoffs at the idea of doing anything about noise by "voluntary" methods.

At first the citizenry cried out against the three-dollar fines—or 11 dollars if they were so brash as to demand a trial—which the courts regularly assessed for the mere blast of a horn. They indignantly protested that one ordinance required them to have a horn, while another forbade them to use it.

Silence Takes Sting from Fines

But after a while the complaints died away, and most people decided that they liked the new silence more than they disliked the fines. Vice-Mayor Claude A. Armour, who has succeeded Boyle as commissioner of silence, says that opposition now is almost nonexistent. On the average, 300 arrests a year are made, and countless warnings are issued.

If most of the weight has fallen on random horn-blowing, that is because sound tests showed this noisy device to be the worse offender against rest and repose.

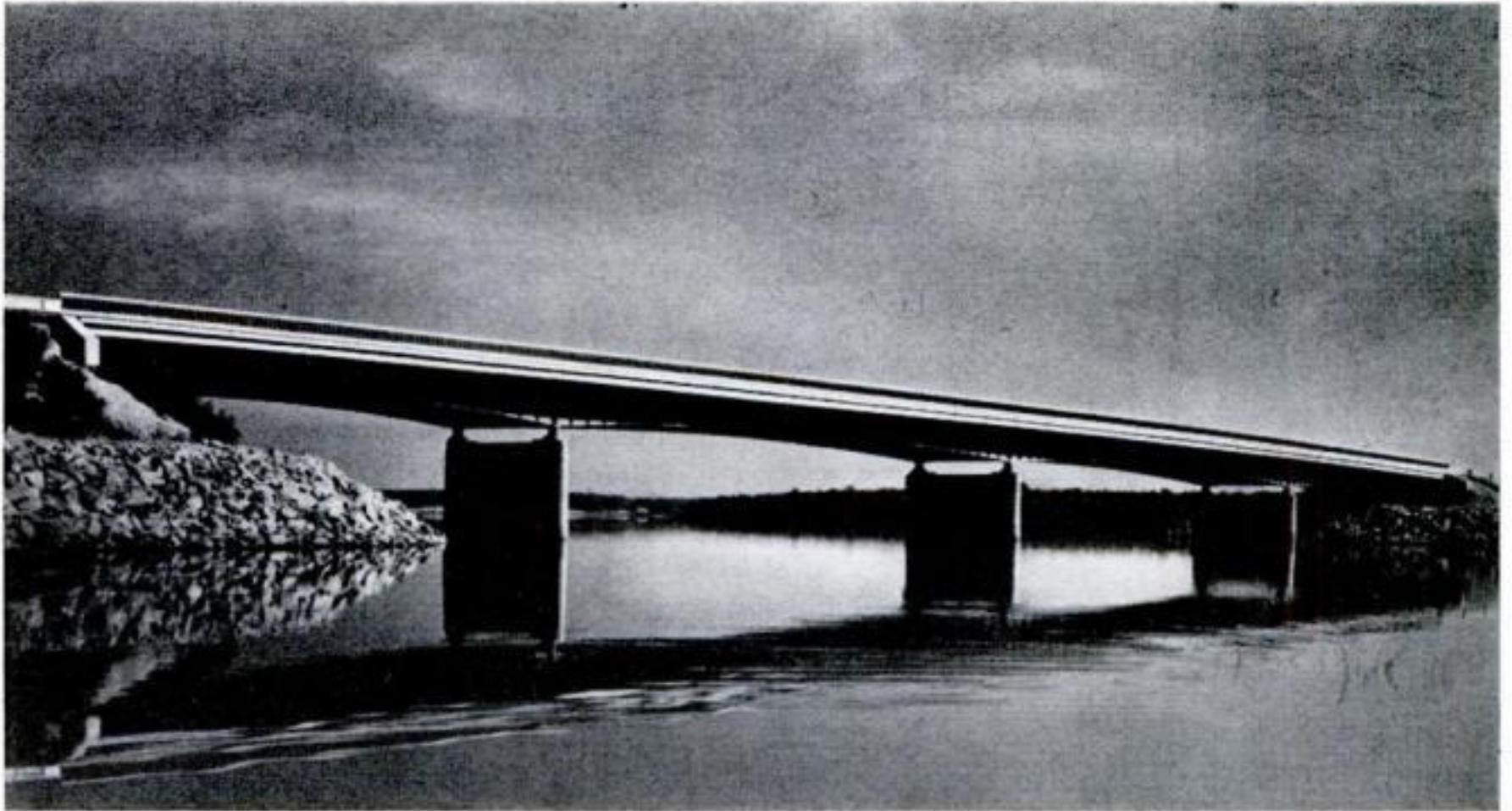
At the outset of the campaign, sound engineers measured the ordinary hum of traffic at the downtown intersection of Main and Madison as 14 decibels.

That is not really noisy when compared with the New York subway (100 decibels), a steel-riveter at work (95), or even a lion roaring good and loud (90).

But the interesting thing was the increment which various sources added to the basic Memphis street noise. A single passing auto raised the reading to 18 decibels. A streetcar raised it to 24. (All the streetcars have since been replaced by trackless trolleys, the quietest things on wheels.)

One blast of a nearby auto horn did

[\[Continued on page 246\]](#)

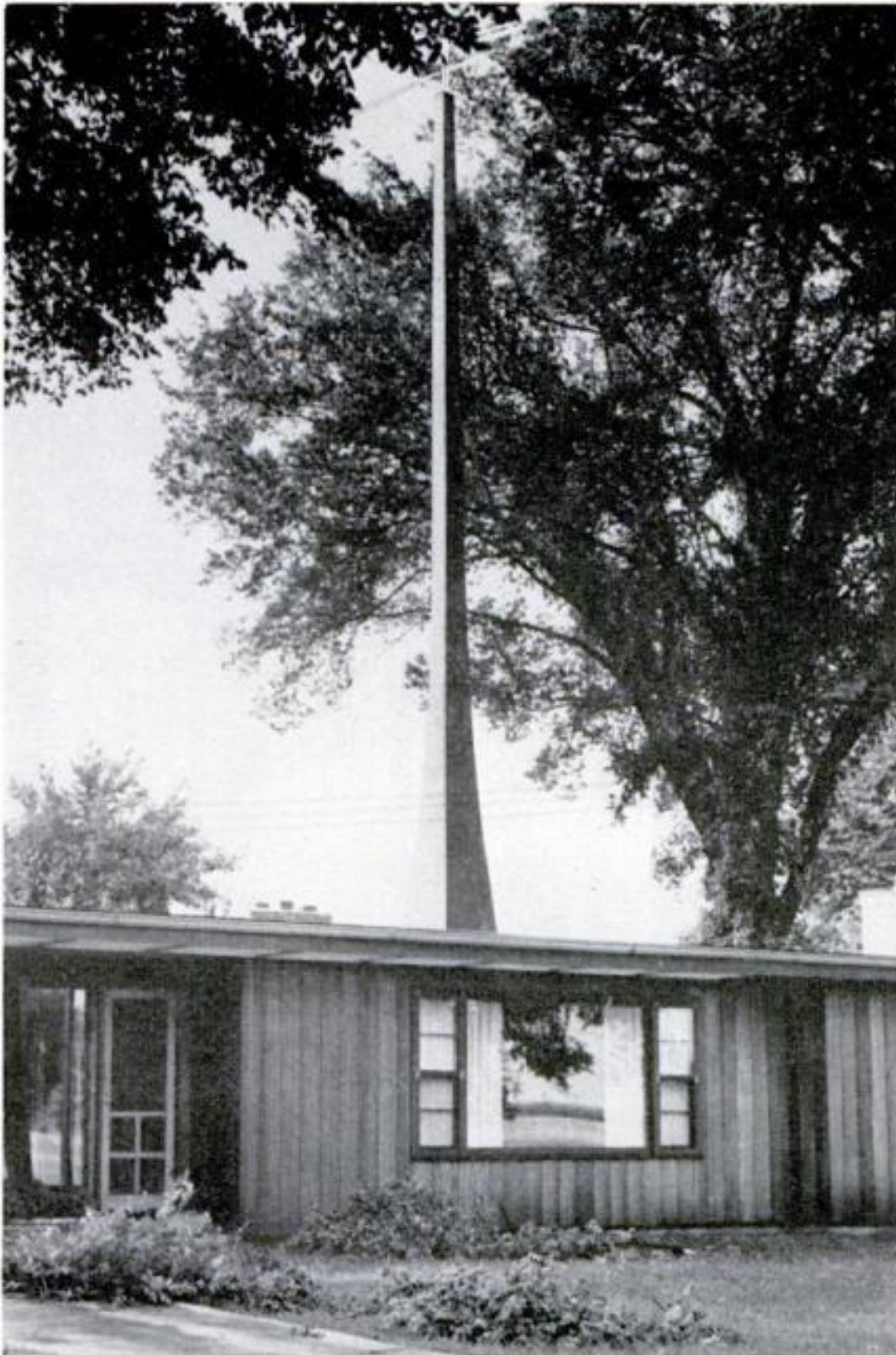


Tennessee Bridge Wins Beauty Contest

SIMPLE, coherent and restful to the eyes, explained five judges when they gave this bridge top honors in the American Institute of Steel Construction's 25th annual bridge competition. One of three winners—the others were the Neches River Bridge in Beaumont, Tex., and a lift span in Miami, Fla.—this Morris Ferry Bridge spans the Elk River in southern Tennessee. A stainless-steel plaque will tell motorists who use it that it has been adjudged the most beautiful structure of its class (costing less than \$500,000) completed in 1952.

TV Tower Matches Modern House

TAILORED to the modern ranch house at left, this 36-foot TV tower is far more sightly than a latticework of steel, and has stood the test of near-tornado-velocity winds. Its builder, J. R. Darrow, of Polo, Ill., shaped $\frac{1}{4}$ " tempered Presdwood board over a sturdy frame of two-by-twos.





Sliding partition swings down to become a dining table.

LETTER T-FOR-TABLE is handle for pulling out oversize solid-core birch door panel from sliding walnut frame. The T then becomes leg for dining table (below).



Scrapbook of Ideas Helps Design a Home

HOW many couples have moved into a new dream house only to exclaim, "Oh, I wish we'd made the fireplace of bluestone instead of brick!" or, "Why didn't we plan for built-in bookcases in the study?"

Not so with the Merle H. Millers of Indianapolis. For almost two years before they started building their new home, Mrs. Miller pasted clippings of things and ideas she liked in a scrapbook.

Into this book-of-things-to-come went such items as: a plan for a work-at-home area for Mr. Miller, with space for typewriter and filing cabinets; a private guest

suite that would serve their older son as headquarters when he was home from college; a light workshop; soundproof sliding doors to separate the sleeping wing from the rest of the house.

When the time came to discuss sketches with the architect, the Millers knew pretty much what they wanted.

Some of the ingenious results of their pre-blueprint planning are shown here and on the next page. Whether you are planning a new home, remodeling an old one or just want to build something useful, the Millers' ideas for built-ins may pay off for you, too, in better living.

Dressing-table top tilts up to hold a lighted mirror.



WHEN TERRY lifts up this vanity-mirror panel on a miniature version of mother's dressing table, she's all ready for primping. Rubber friction catch holds mirror up. Louvers at right of bench are drawers.



Please turn the page for more home ideas.

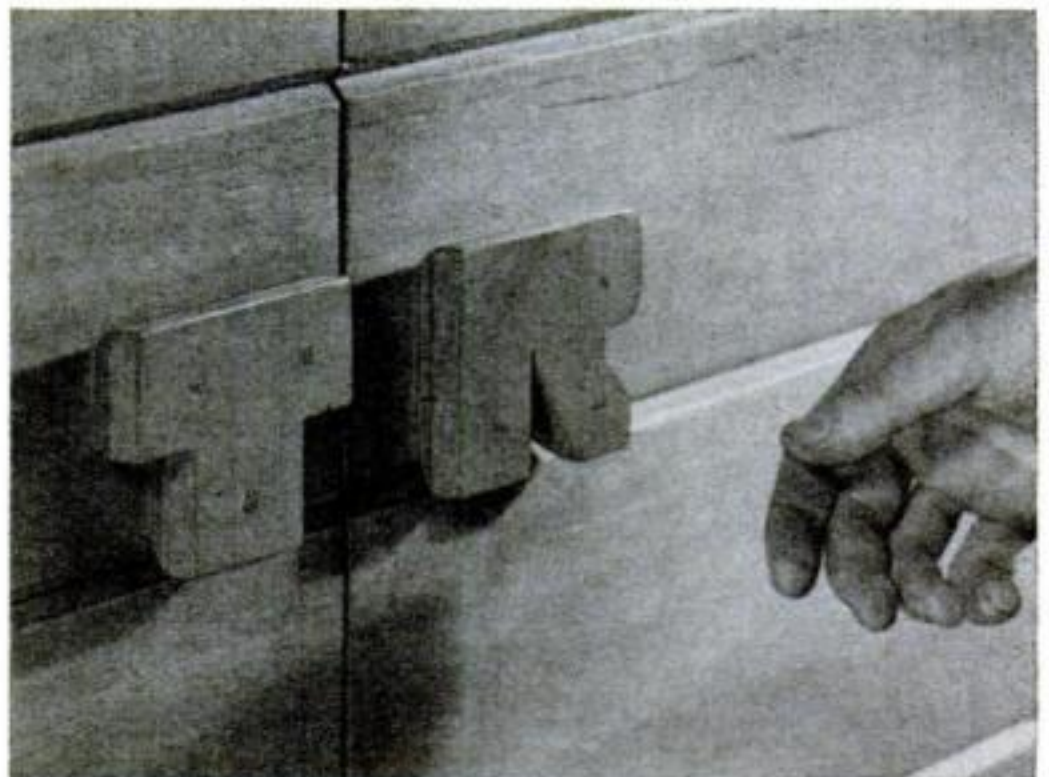
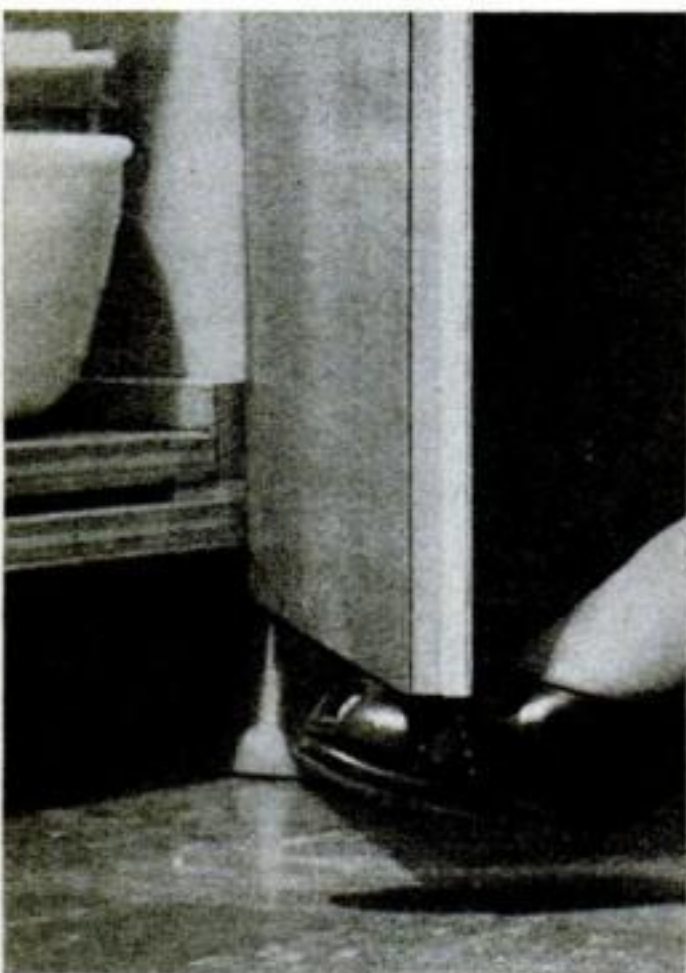
JANUARY 1954 157



Pull-outs provide storage space that is easy to get at.

LESTER demonstrates easy-reach towel trays in children's bathroom. Like all the kids' furniture, cabinet is built to small-fry scale. At upper right are Daddy's shirt shelves; lower right, racks for table linen.

Some doors need no handles. On others, handles show what's inside.



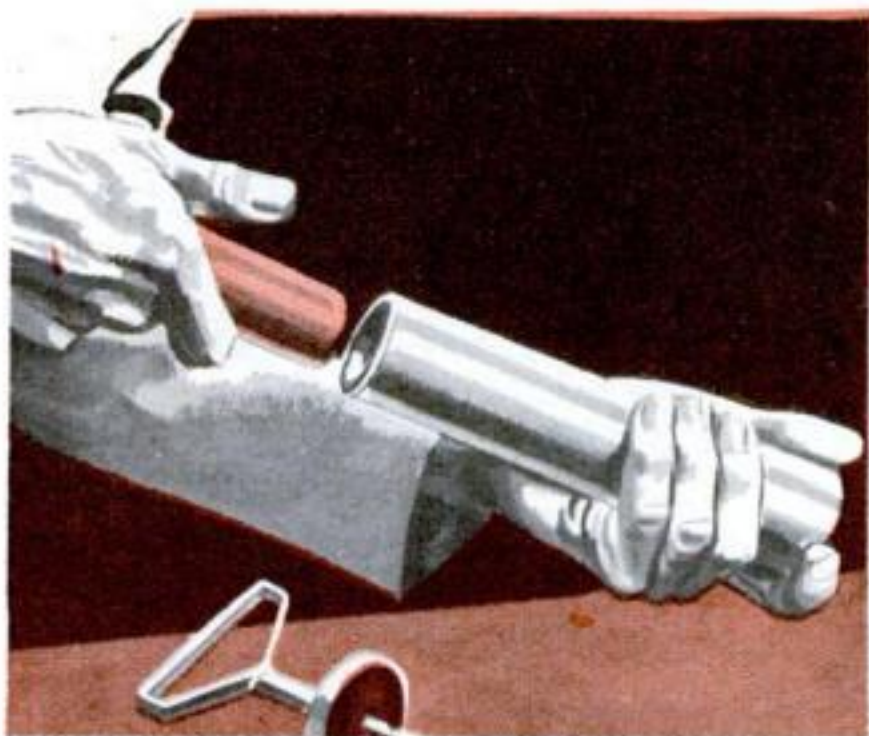
NO BENDING to open kitchen-cabinet base doors (left). Foam rubber on bottom protects shoes. Shelves slide out. Cutout wooden letters on each built-in identify its use or user. T R above stands for toolroom.

I'd Like to see them make...

Everyone has his own pet idea of some gadget he would like to see in general use. What is YOURS? Popular Science Monthly will pay \$5.00 for each one published. Use government postcards only. Contributions cannot be acknowledged or returned.



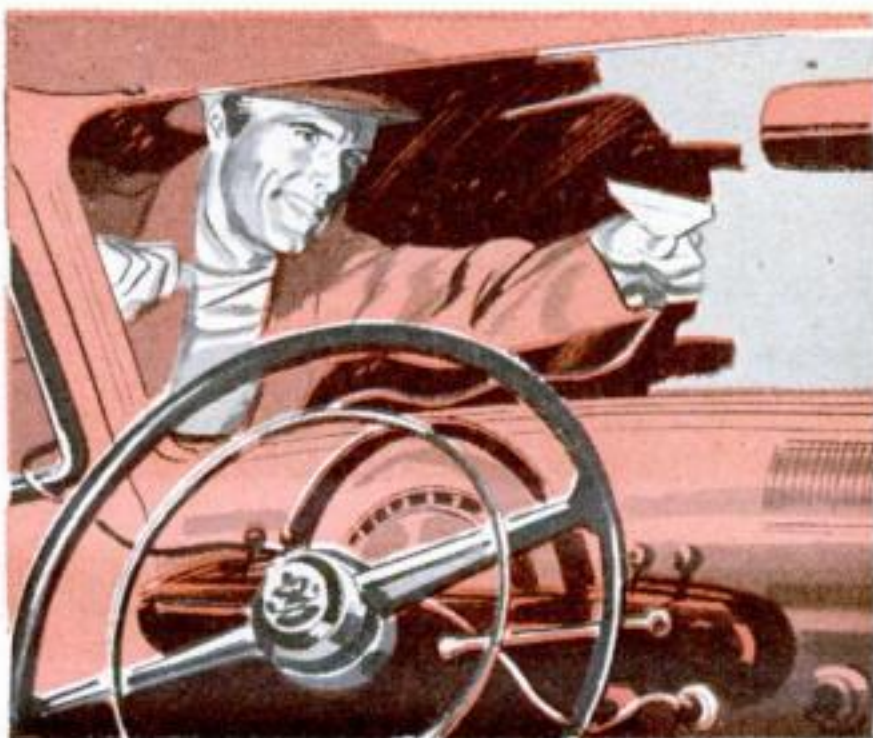
A HEATED BED JACKET, wired like an electric blanket, for convalescents and people who like to read in bed after the furnace has been turned down.—*Oscar Levin, Brooklyn.*



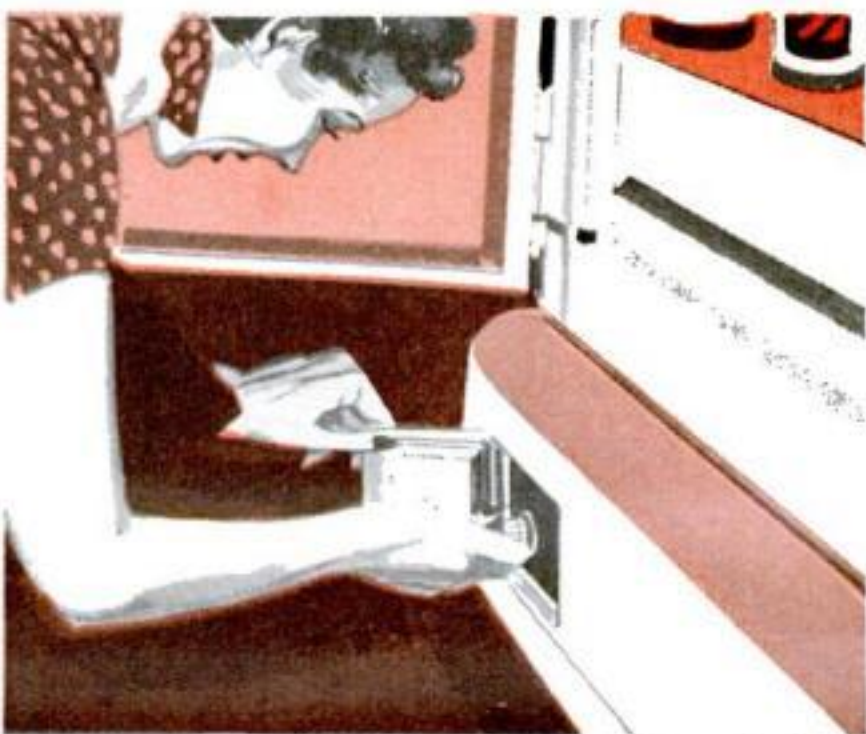
GREASE GUNS of the high-pressure type that would take throw-away cartridges like calking guns, eliminating that messy packing job.—*H. Clough, Boulder Creek, Calif.*



LOOSE-LEAF PAPER with built-in reinforcement at the holes. A plastic strip bonded to the edge would make a tearproof page for heavy-duty use.—*P. Alden, Montclair, N. J.*



A WINDSHIELD SCRAPER that would heat up when plugged into a car's cigarette-lighter socket. It would do a fast job of cleaning off ice.—*David Trump, Ames, Iowa.*

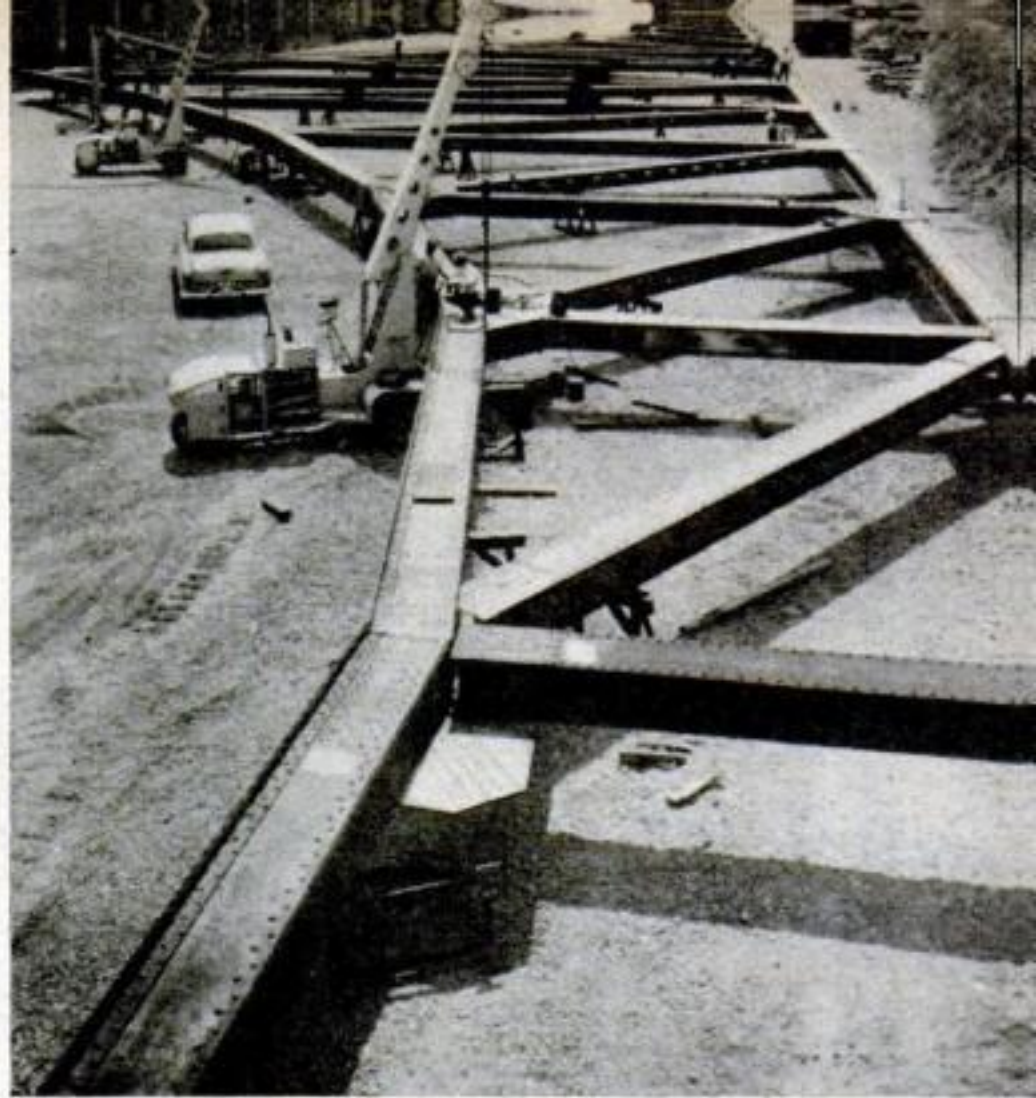


A REFRIGERATOR with a fireproof vault built into its base so that a householder could safely store valuable papers at home.—*Mrs. Edward Zavodnik, West Branch, Mich.*



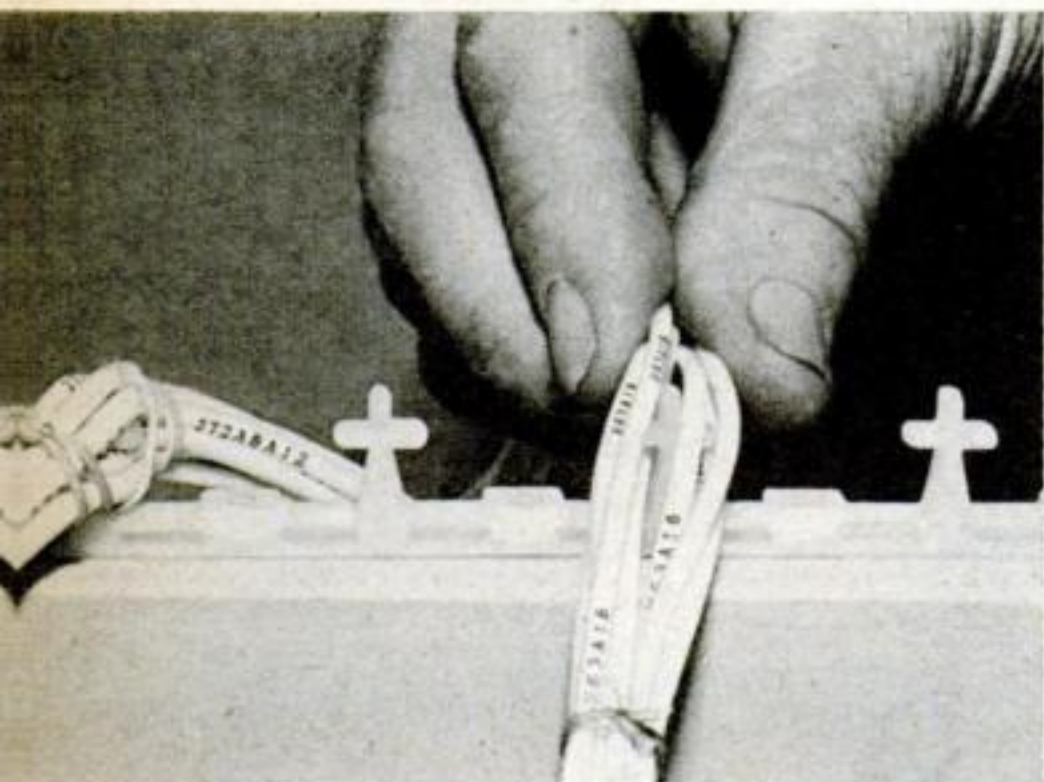
Jacks Prevent Plane Flats

BIG bombers like the B-47 are hard on tires, even when they're standing still. Now, instead of moving a grounded plane at intervals, to put its huge weight on new sections of the tire treads, small motor-driven jacks are wheeled under the landing gear. The plane then is lifted, and its wheels turned to fresh tire areas.



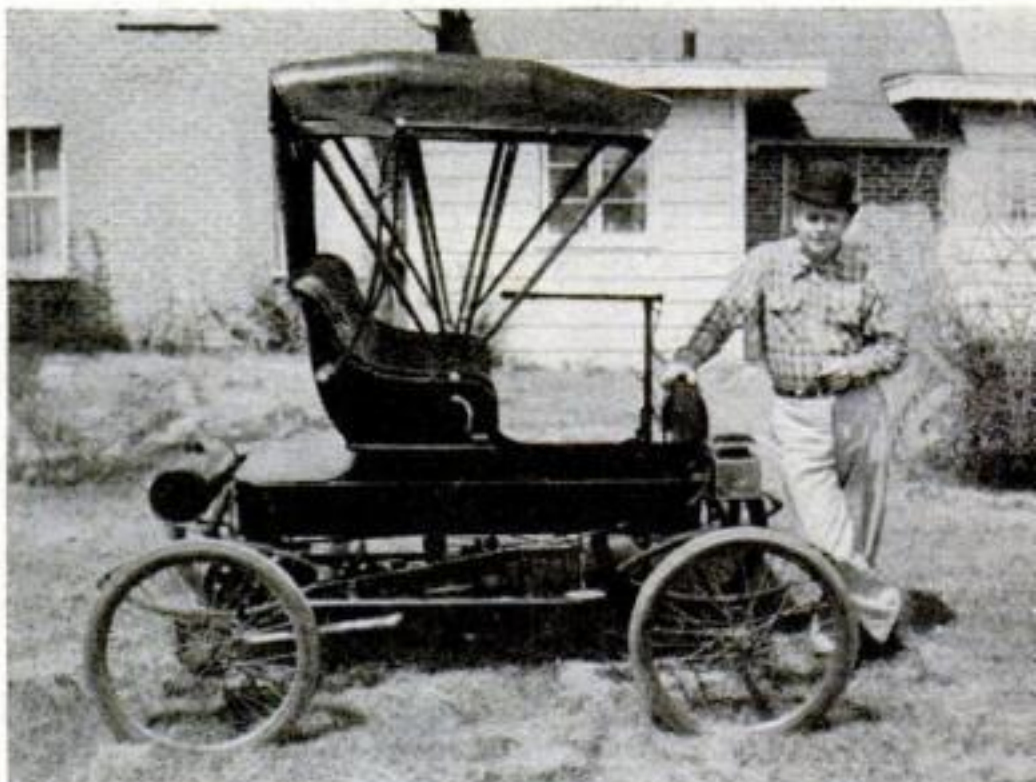
Giant Bridge Outgrows Factory

BRIDGE prefabricators had to take this job outdoors. It's one truss of a 5,200-ton bridge soon to span 20 railroad tracks, a highway, a canal and a river at Akron. After assembly and checking by Midland Structural Steel at Hammond, Ind., the trusses will be taken apart and shipped to the site on 250 freight cars.



Wiring Is Speeded by Crosses

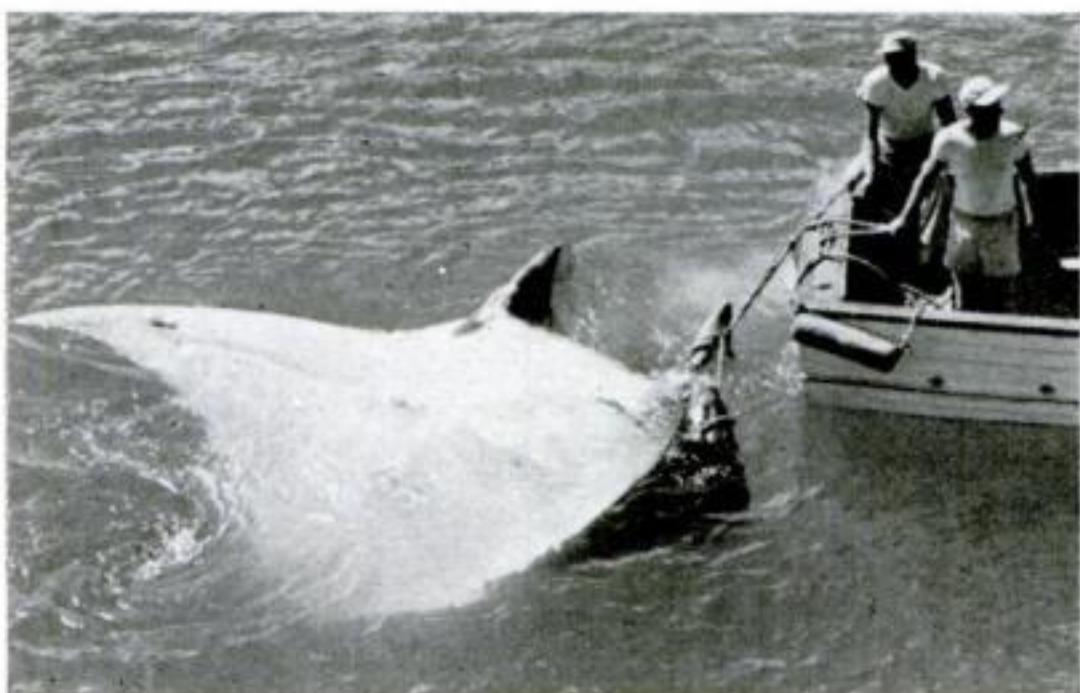
PLASTIC strips with tiny "tombstones" spaced at intervals along one face are cutting costly man-hours from the job of wiring Boeing planes. When wire bundles are wrapped around the crosses and secured with string, the "tombstones" make short-circuit-free, easily installed hangers which are reported superior to metal clamps.



Built His Own "Old Olds"

A MACHINE-SHOP proprietor with a yen for the past built this horseless carriage around a surrey top and a power-saw motor. Resembling a 1903 Oldsmobile, the run-about is the work of LeRoy Freck of Hillsboro, Wis. Its archaic design is only tin-deep; the buggy rolls along at a snappy 18 miles per hour.

*How a Yale scientist, sort
of by mistake, caught*



DOWN BUT NOT OUT, Yale University's record-breaking, ton-and-a-half-plus manta is towed to a Peruvian port. After hours of battling, it was exhausted but still breathing.



ALL THE TOWN'S MEN couldn't haul the enormous sea beast up the beach at Cabo Blanco, Peru. Three trucks took turns at the job before the devilfish was out of tide's reach.



SCHOOL WAS LET OUT so that the kids of Cabo Blanco could get a vivid lesson in natural history. With those two fins at lower left, the ray swept small fish into its mouth.

World's Biggest Devilfish

By Gardner Soule

“WE HAD fought a manta ray for four and one-half hours off Africa,” says Ed Migdalski, a museum technician at Yale University, “so I knew what it was like to try and get one.

“It was hell.”

The African manta got away. But Migdalski and a crew from Yale University tried again, and landed their next one—off Cabo Blanco, Peru, not long ago.

The manta ray, the devilfish of much fiction about the ocean, is also named the sea bat. A huge, flat fish, he grows up to more than 18 feet across, or from wing tip to wing tip. His flapping fins at each side are called wings. He swims very powerfully, as does the shark, to which he is related. And even while his life ebbs from a harpoon barb inside him he is likely to have enough of his strength left to pull a boat over the ocean.

Goes Fishing for Exhibits

Migdalski was down off Peru gathering specimens for Yale's new Hall of Fishes. A preparator, he has to collect and make plaster molds of specimens. Later he paints the resulting casts in natural colors and prepares them for exhibit.

Looking back on his struggle to catch and land the manta and make molds of him, Ed Migdalski today feels exactly as

Mammoth manta ray was shot, hooked and finally roped in—still alive.

he did the day the battle took place. "I never thought we'd do it," he says.

That's partly because it was such a struggle to land the big bat fish, and partly because Migdalski had no intention of trying to catch a big one. An ordinary sample would have suited him fine. But, he says, "we just happened to get into a fine mess of them. We saw five or six that day.

"A Peruvian native with a harpoon was standing on the starboard side of the bow of our fishing boat, the *Suzanne V*, captained by Bill Fagen of Miami.

"I was on my knees behind the native boy, holding on to a five-gallon drum. A hundred fathoms of quarter-inch manila rope was wound around the drum and attached to it on one end. At the other end the rope was attached to the harpoon.

"At about three p.m., the ray was spotted, to starboard, close alongside the bow.

"At 3:02, the boy sank the harpoon into the middle of his back."

Devilfish on a Rampage

Crisis No. 1 happened instantly—the first thing the manta did.

Migdalski expected the ray to swim away from the boat. Instead, the devilfish crossed the bow. The rope was jerked across the bow deck with such force the native could have been injured or swept overboard. Migdalski screamed at the boy to duck under the rope.

He did—in time.

Crisis No. 2 came a split second later. The drum, with all the power of the ray hauling it, could have crashed into and carried away the rail on the port side. Migdalski with all his strength heaved the keg from the starboard of the vessel over the port rail. It cleared by inches.

The ray sped across the Pacific. He



MAKING AN IMPRESSION for Yale's new Hall of Fishes, Ed Migdalski pours plaster over the dead body of the manta ray as it lay in the sun. The plaster quickly formed a mold.

churned a great white wake on the surface. The *Suzanne V* pursued.

"We followed the ray for miles," says Migdalski. "The rope paid out rapidly from the drum.

"There was a slight chop on the sea, but it was easy to keep the ray in sight, what with the drum and that huge white wake and the spray.

"Finally we caught up with the keg and took it aboard."

Then an hours-long fight began.

"The ray would stop," Migdalski says, "and we would pull in more rope as vigorously as we could. We were really putting it to him. We had to exhaust his strength.

"We couldn't let him rest."

Crisis No. 3: The rope got all fouled up on deck. Anyone could have been caught in it and dragged overboard. "I kept an open knife right by my hand all the time, in case someone should get the rope around an arm or leg," Migdalski recalls.

Hail of Bullets Fails to Kill It

"Sure, we had our procedure all planned, but this thing was so big—so big that things happened so we couldn't go according to plan."

When they got close enough, they shot the ray. "Bud King, an angler on the ex-



WHAT A WINGSPREAD the huge devilfish had is well indicated by a measuring line of curious children. They are watching Migdalski plaster stiffening rods to the manta's mold.

pedition, was standing by. When he could, he shot at the ray with a .38 revolver.

"Nothing happened.

"Bud hit him in what would have been vulnerable spots for any other animal. He riddled him with ammo. He didn't kill him."

Now the boat drew up alongside the giant fish.

Crisis No. 4.

When the ray was near the side of the boat, a huge wing would come flapping and crashing over the rail.

Wounded Ray Keeps Crew Hopping

Everyone had to sidestep, hop, jump or run to duck the blows that might have meant a nasty wound.

"Then," says Migdalski, "we tried to gaff him.

"We would get marlin gaffs, big iron hooks, into him and he would straighten



HEADED FOR NEW HAVEN, the first of four molds of the manta ray is lifted off the monster's carcass. The molds, too large for a fishing boat, traveled to U.S. by freighter.

Devilfish captor also landed a monster of another kind.

Ed Migdalski caught another record-breaking fish on the same trip when he caught the ray. It was an *arapaima gigas* (right). If you haven't heard of that critter, don't be surprised, for none had been caught by a white man in almost 40 years. This is probably the first photo of an *arapaima*, the world's biggest fresh-water fish, ever printed in the U.S. Migdalski landed it in British Guiana on a 12-to-15-pound line. The giant, prehistoric-type fish is considered a record for such light gear. Those scales on the *arapaima* are olive green, and halfway back to the tail they begin having red edges.

Migdalski also caught many piranhas, the flesh-eating fish of South American rivers; a

27-pound, black, orange and white catfish; and an electric eel. Asked to comment on his 1953 luck, Migdalski said, "I'd rather fish

than eat. I love to eat 'em. I love to work with them. I feel I am more closely related to a fish than to most people."

Besides Migdalski's catches, the Yale expedition to South America brought back a number of big-game fish, which the expedition was studying; several thousand specimens of Humboldt Current fish, including some un-

known varieties; and a wealth of information about the Humboldt Current itself.

The scientists estimate that it will take them three years to correlate their findings and study the specimens.



them right out. We lost five gaffs that way."

That was all the gaffs they had. How could they bring in the devilfish without gaffs?

The flapping wings, crashing over the side, provided an idea.

"As the wing came over," says Migdalski, "two natives would try to grab and hold onto it. I would gouge it with a knife. After many tries, we got a hole in the wing.

"Then we got a rope through the hole, and tied the wing securely.

"Finally we got a rope around his body. No, I don't know how we did it, but we did. It took about an hour and a half to tie him up. Then we dragged him astern into the harbor.

"As we entered, I looked at my watch. It was 20 minutes to 11." Seven hours and 38 minutes from the time the harpoon landed.

The harpoon, a native one, had a wooden handle about six feet long and a small (four-inch) harpoon barb. Even though the ray had straightened marlin gaffs as easily as you bend a paper clip, that native harpoon had held.

The ray was still alive. He died that night in the harbor.

"No," says Migdalski, "the heat wasn't bad that afternoon. We wouldn't have noticed it, anyway."

Whole Town Tries to Haul in Catch

Next day, the rope towing the manta was transferred from the *Suzanne V* to a motor launch. The launch hauled the ray to a pier.

Natives took over the rope in an effort to haul the ray ashore. They could pull the manta through the water, all right, but not up the beach.

Cabo Blanco's school kids were let out,

[Continued on page 278]



Longest Rails Snaked 850 Miles to Location

THREADING Northern Pacific's sharpest, 12-degree curves as easily as boiled spaghetti, eight half-mile lengths of welded rail made history when they were wheeled 850 miles from Big Timber, Mont., to the road's

Stampede Tunnel, near Seattle. The longest "packages" ever shipped so far, the rails traveled on 60 open-end ballast cars. They will eliminate clacking joints, cut maintenance in the two-mile tunnel.

Educated Gas Pedal

Keeps the Cops Away

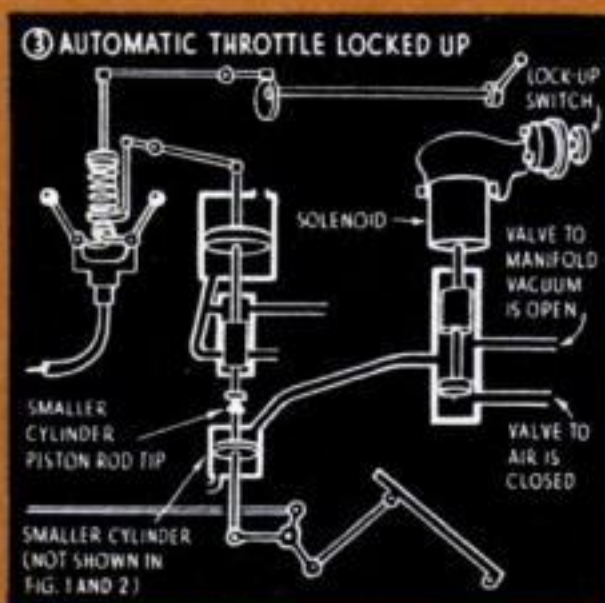
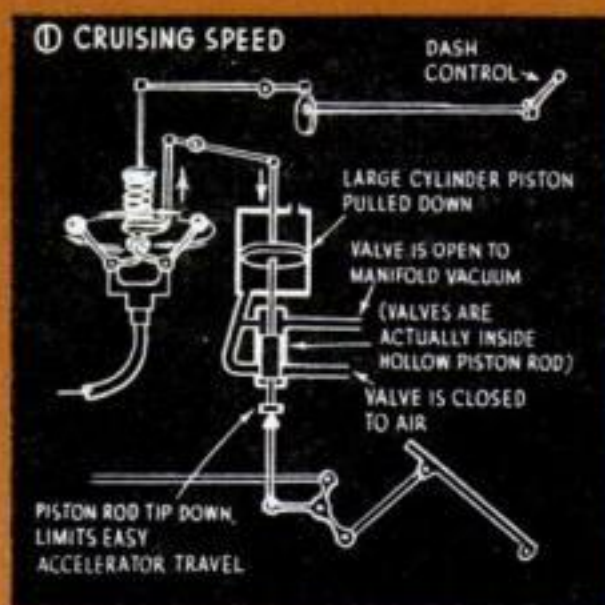
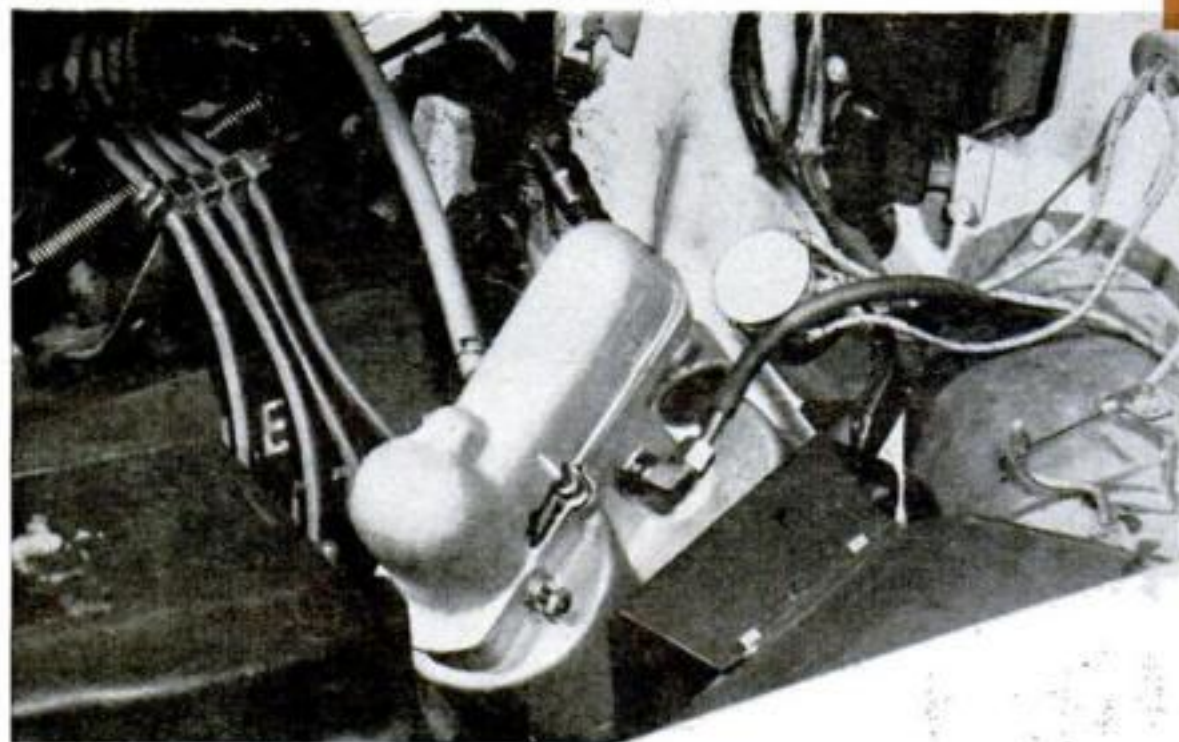
By Frank Rowsome Jr.

IF YOU have an errant impulse to drive with your right foot in the glove compartment, you should meet the Speed-o-Stat. This is a new and fascinating gadget—a kind of power-operated accelerator, or governor with extras. It definitely takes us several miles farther down the road toward automatic pilots for cars. You'd better meet it now, because it looks to be part of the coming auto scene.

Let's take a ride to the next city down the highway in a car equipped with a Speed-o-Stat. You fire up and pull out of the garage as usual. There is a little adjusting lever on the dash with a button nearby. The lever happens to point at, say, 35 m.p.h., about the maximum safe speed in your neighborhood. Your car handles exactly as always. If you want to be flamboyant, you can readily floor-board the gas pulling away from a light. The single difference is that now you can't *conveniently* drive over 35 m.p.h.

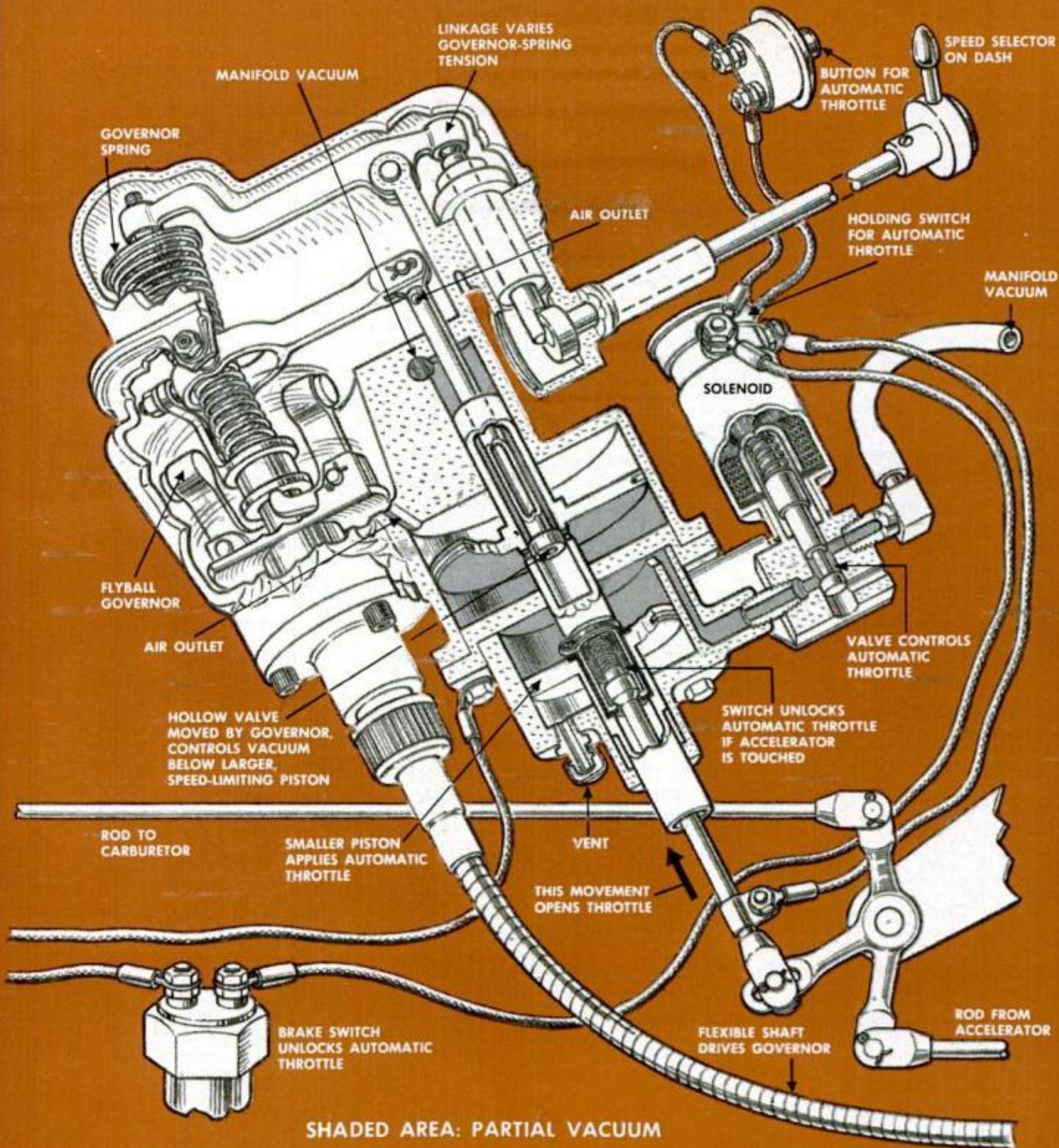
What happens, if you try, is that the accelerator pedal pushes back at you, gently at first, astonishingly hard if you don't take the hint. Up to 35, the pedal is soft as ever. Above, it can still be floor-

Speed-o-Stat nestles next engine, just ahead of fire wall.



Here's How New

SKETCHES directly above show operation of the speed control, drawn in detail in big cutaway. 1. Setting speed on dash dial adjusts the tension on a spring—the higher the pre-set speed, the tighter the spring. As car speeds up, a flyball governor, run off the drive shaft, pushes upward more and more against the spring. When pre-set speed is reached, the governor overcomes the spring tension and moves an arm. This opens a



Speed-o-Stat Uses Manifold Vacuum to Control Your Speed

valve that allows the manifold vacuum to suck the air from the lower end of a large cylinder, pulling down a piston. The rod tip of this piston limits the upward travel of a rod linked to the gas pedal. To drive faster than the pre-set speed you must push down on the accelerator hard enough to force the piston up against the pull of the manifold vacuum. 2. When the car slows on hills, the governor slows, the spring tension over-

comes it and pulls the arm to the cylinder back up. This opens an air valve that destroys the vacuum in the cylinder so that the piston can now move freely, offering no resistance when you push down on the gas pedal—until the pre-set speed is again reached. 3. The lock-up device works through a smaller piston lined up end-to-end with the large one. Setting the dash lock-up switch signals a solenoid to open a valve that

allows the manifold vacuum to pull air out of the upper end of the smaller cylinder. This moves a piston up in this cylinder until the projecting end of its rod butts against the rod tip of the piston in the bigger cylinder. The smaller piston can never overcome the push of the bigger one, but it keeps tight up against it. The rod of the smaller piston is linked to the throttle, so it keeps the throttle as far open as the big piston will allow.



DRIVER is pointing to speed-setting dial on the dashboard. Above it, slightly to left, is control that locks up the device, acting as a "phantom foot" on gas pedal.

boarded, but you have to invest 30 to 50 foot pounds into overriding it. This is an effort that can be put out for a short time by even a fairly flimsy woman, but it tires you fast. So you just don't go over 35.

By now you have threaded out to the intercity highway. It is placarded at 55 and the state cops leave you strictly alone up to about 60. You reach over and tweak the Speed-o-Stat lever to 58. Instantly the lower-limit pedal resistance backs away until she gets up to speed. Then the pedal starts giving you that same take-it-easy-Mac business if you try to overdo. Notice that the gizmo is sensitive to road speed, not revs. If you downshift, the gas pedal frees up and gives you no back talk until car speed comes up to the governed setting.

Now that you are wheeling all alone down the concrete, touch that button beside the lever and take your foot off the gas. This puts you into "full automatic." The car holds to set speed. Your right foot is free to stretch or loll about. If you see trouble coming, touch either the brake or the gas and the Speed-o-Stat instantly unlatches, leaving you in

conventional control. She won't lock up again until you bring it back to the governed speed and touch the button.

Why. Speed-o-Stat was invented by Ralph Teetor, president of Perfect Circle, an automobile engineer who has been blind since early childhood. With the sharpened perceptions of the blind, Teetor noticed that much speeding by persons who drove him seemed to be involuntary, or at least unintentional. He observed that many drivers are not visually speed-sensitive, particularly at night, and that after a long, fast run, they often unconsciously drove way over speed limits in towns. He set out to design a driver-reminder that would have these characteristics:

- A dash control that could be conveniently set by the driver throughout the speed range.
- No interference with normal operation below the set speed.
- A warning that, in emergencies, did not offer an absolute restriction—that could be overridden in a pinch without taking time to reset the control.

How. The speed-sensing mechanism of the Speed-o-Stat is a flyball governor, operating off the drive shaft. This governor uses the manifold vacuum to push down a big piston that

limits the travel of the accelerator pedal. To drive faster than the set speed you must overcome manifold vacuum.

The lock-in device in effect provides a mechanical foot to keep the accelerator pedal pushed down to the limit of easy travel. To do this, manifold vacuum is used to push a smaller piston, attached to the gas pedal, up against the big one.

The disconnect works when you touch either the brake or the pedal. This breaks the electrical circuit that has valved vacuum to the smaller piston, and so releases the accelerator.

How well does it work? Very nicely. On most cars and roads, speed is stabilized within one mile an hour.

..... HINT TO AN UNHANDY HANDY MAN
It's basic, fundamental
Advice that never fails—
The more you "choke the hammer,"
The more you bend the nails.
 —BERTON BRALEY

One circumstance where the automatic control can't keep speed on the nose is on a very steep climb begun at low governed speed. The most Speed-o-Stat can do is open your throttle wide—it can't give that little climbing run a driver unconsciously provides.

On Dynaflow Buicks and other cars with scant foot-off engine drag, you get some overshoot after cresting a hill, though it rarely amounts to more than two or three miles an hour. Down a long, steep hill, cars with little drag won't hold to governed speed, since the maximum braking response Speed-o-Stat can give is to shut the throttle. But in any car or terrain, the pedal-resistance feature seems to track precisely—much better than you could hold speed yourself, even with your eyes on the speedometer.

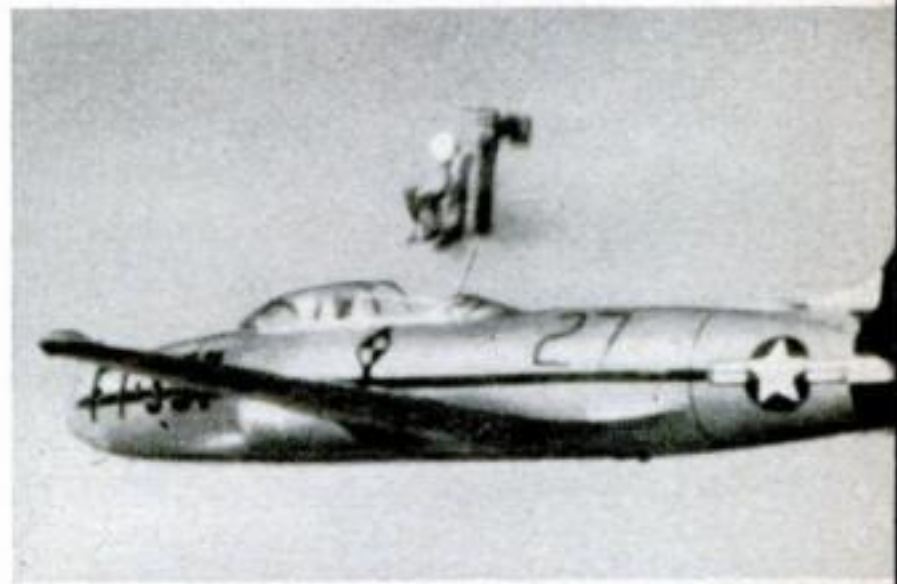
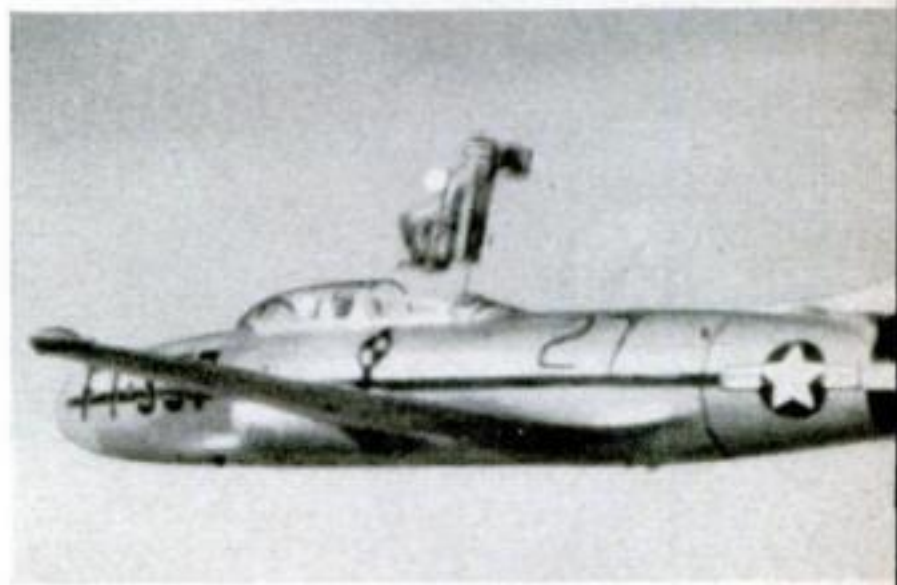
What's it good for? The Pierce Governor Company, of Anderson, Ind., which makes Speed-o-Stat, thinks it belongs on passenger cars as well as trucks and buses. The main pitch is on safety—a tactful reminder when you hit it up unconsciously. Driving convenience and freedom from those right-leg creaks on long hauls are additional points. Peace of mind about the cops—no need to keep one eye on the mirror and another scanning the road for a trooper in the shrubbery—is another. Some gas saving is also claimed, because of even, gentle throttle-handling.

How safe is it? Mechanically, there is no evident way in which a malfunction could possibly give unexpected throttle opening. It "fails safe" in that either vacuum or electrical trouble simply leaves you with a conventional accelerator pedal.

Psychologically, Speed-o-Stat may come in for criticism on the grounds that it might open the way still more for "speed hypnosis." A drowsy driver, droning along a monotonous road with nothing to do but steer, might be still more likely to drop off for 40 fatal winks.

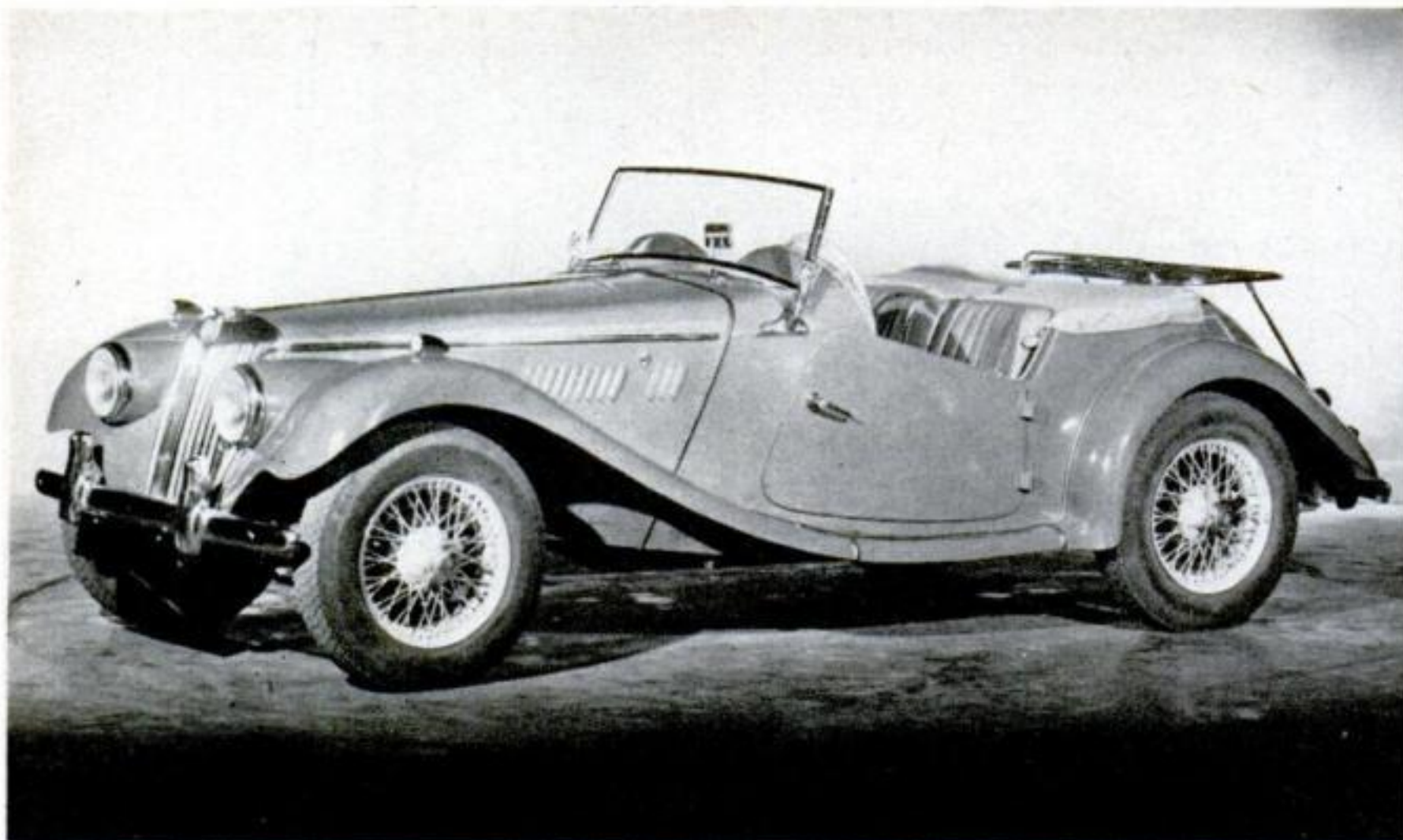
Pierce engineers, however, disagree. They argue that the device frees a driver from right-leg cramps, lets him readjust

[Continued on page 264]



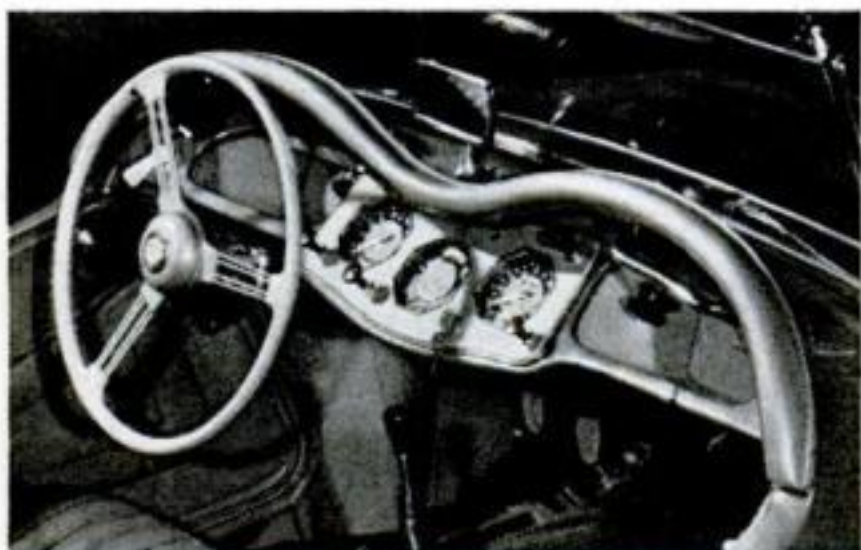
Pop Goes the Pilot!

ABOVE is a bird's-eye view of how a USAF pilot dismounts while his flying horse is racing at better than eight miles a minute. The ejection device pops him out seat and all—and doesn't even tip the seat. The plane's a jet trainer.



Sloping hood makes the new MG look even lower than its 48½ inches to top of windshield.

MG Slicked Up to Look Expensive



REDESIGNED COCKPIT has slanting dashboard with regrouped instruments, two open glove compartments. Seats are individual buckets.



FOUR-SEATER MODIFIED-IN-U.S.A.—a special reworking of the old TD model—now lets you take Mom and the kiddies along to the rallies.

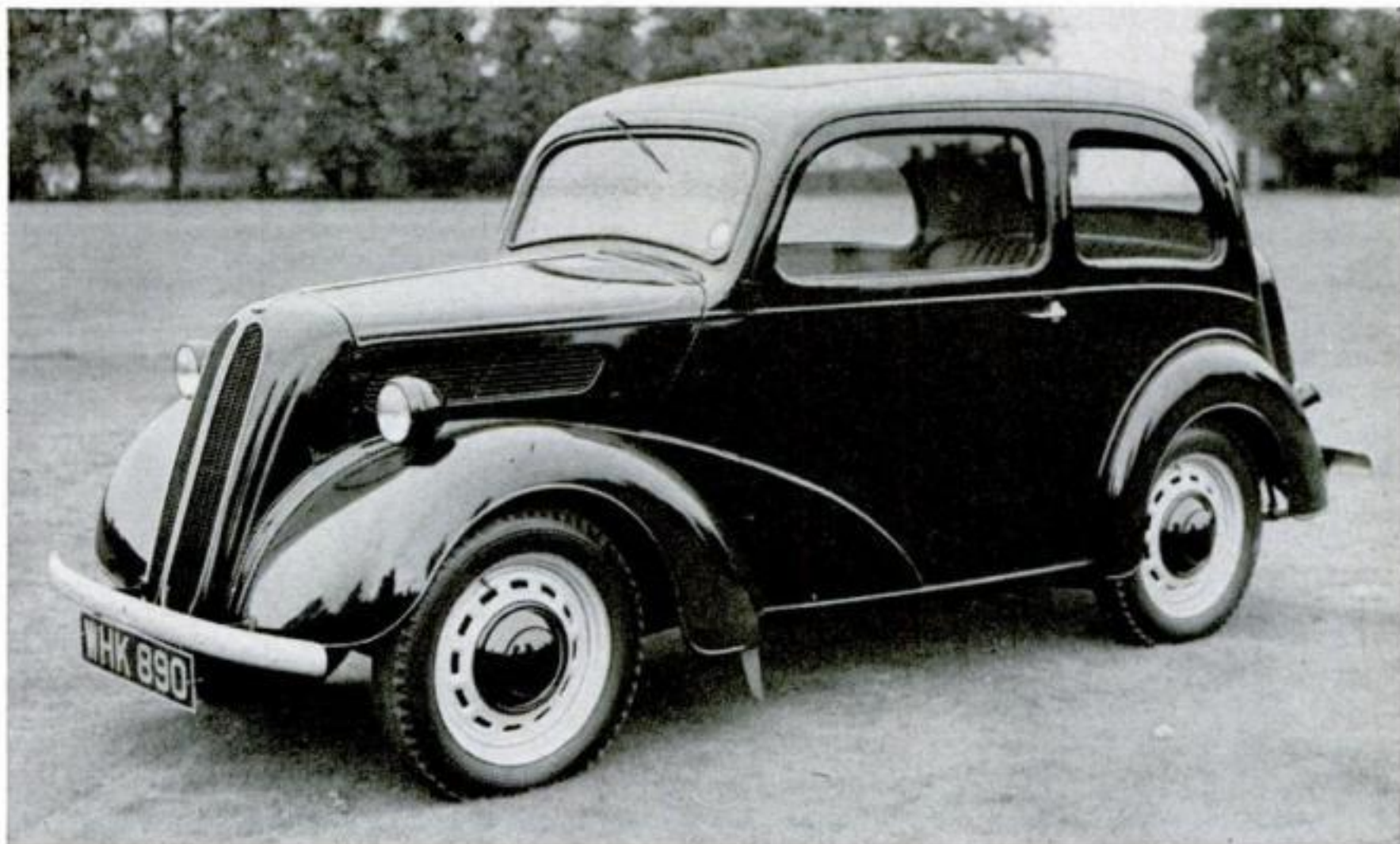
MG FANS, as fanatic a clan as you'll find in the motor world, seldom get a new model and usually look askance when they do. The racy beauty above should prove the exception. It is the TF, first change in their beloved Midget in three years and only the fifth since the T series appeared in 1936.

The big modification is mainly in looks, the company frankly admits. Gone are the squared-off radiator and archaic headlights. The hood now slopes more sharply to the radiator and the radiator itself is slanted. The headlights are faired gracefully into restyled fenders in the Italian fashion.

And the wire wheels are back to quiet the anguished cries that mourned their disappearance from the 1950 TD. On the TF they are optional extras, however.

Principal engine change is the addition of twin air cleaners, with a slight increase in horsepower to 57. Top speed is about 90.

American admirers of the MG who have wanted room for the family in this sportster can now buy a four-seat version. Not a factory job from England, it is an alteration of the 1950 TD model done in New York by the U.S. distributor, J. S. Inskip, Inc. The standard TD is lengthened 10 inches by the addition of new frame members, and a rear seat is installed.

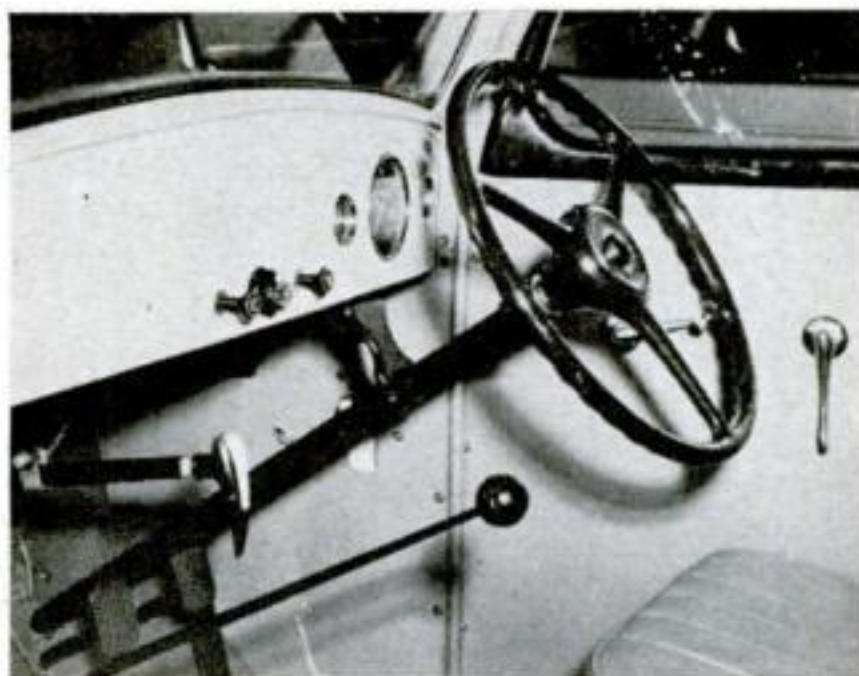


This Ford, introduced at recent London motor show, is called "world's lowest-priced sedan."

British Ford Stripped Down to \$770

THE word "Ford" means something different in England. For one thing, it means "the world's lowest-priced automobile," selling for \$770 in U. S. money without the British "purchase tax." British-made, it has 30 horsepower and will go up to 50 miles on one Imperial gallon, equal to 1.2 U. S. gallons. To the basic price the British add a tax of \$324.

The Popular, as it is called, is one of five brands of Ford cars made in England. The others are the Anglia, Prefect, Consul and Zephyr Zodiac. Considerably higher-powered than their stablemates, the Consul and Zephyr (PSM, Sept. '53, p. 134) are made largely for export.



AUSTERE by American standards, Popular's panel contains only essential instruments.



LOOKING MUCH LIKE Ford Consul, Prefect has 36-horsepower engine, same as Anglia.



BIGGEST British Ford, Zephyr has 68 horsepower; Consul, its sister export car, has 47.



Biggest Helicopter Hauls 40 Men or Three Jeeps

LIKE the tiny French 40-and-eight boxcars of World War I fame, the Air Force's newest helicopter has room for 40 troops. But the Piasecki Transporter, the world's largest, is

134 feet long—equivalent to two U.S. boxcars. It has two engines but can fly on one. In place of troops, it can carry 32 litters or three jeeps.

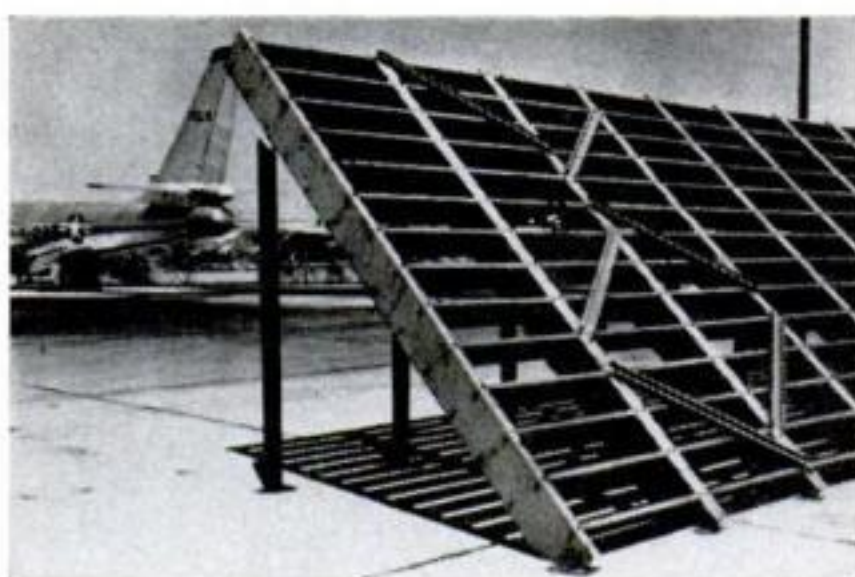
Flying Wing Trains Gunners

BRITISH jet pilots practice gunnery with this tow target shaped like a flying wing. The 25-foot model has a metal skin filled with plastic for greater strength and is fitted with dive brakes and a tail chute.



Turboprop Sheds Its Starter

WHAT looks like a fuel-tank pod beneath the wing of the Navy's turboprop Skyhawk is a portable engine starter designed by Douglas. Left behind at take-off, it cuts 500 pounds from a plane's weight, enough for an extra bomb or several more rockets.



Fence Deflects Jet Blast

SO THEY won't mow a man down with jet exhaust, planes on the Boeing flight line are being fenced in. Curved vanes on tilted steel screens, set about 100 feet to the rear of Stratojets during ground engine run-up, deflect the blast upward.

Hardly Anybody Noticed Last Year's

Most Significant Science News

Discoveries in '53 may indicate long-sought answer to ultimate puzzle: What is the world made of?

By Martin Mann

THE hydrogen bomb—American and Russian—made the headlines last year. But it was hardly news to the physicists who had made it possible. They knew it was coming. To them the big news in 1953 was further progress in exploring and explaining what the world is made of.

This is a task that never seems to end. Many times the



A new and even stranger picture of the atomic core is indicated by machine built last year at Stanford. By diverting high-speed electrons through pipe at left against target atoms in drum, scientists learned core is not uniformly dense, but has fluffy edges like cotton ball.

physicists have found what seemed to be a final, clear picture of the building blocks that make up people and trees and water and everything else in the universe. Each time new evidence has come along to prove that picture was wrong or incomplete. Recent years have brought an overabundance of such confusing new evidence, with discovery crowding discovery.

This research has no practical use in sight. The men working at it can hardly tell in words what they find, let alone

guess how it might cure cancer or make cars cheaper. Yet just such highfalutin curiosity in the past led directly to the very practical benefits and horrors of atomic energy.

What is the world made of? Too many things. First, it is made of molecules. Trees and people are mixtures of different molecules; water is all one kind of molecule.

Atoms Combine in Countless Ways

Molecules in turn are made of atoms. There are only 90-odd atoms, but these are enough to make a tremendous variety of molecules. Scientists make new molecules for bug killers and textiles every day by juggling the world's small stock of atoms.

Atoms are made of . . . Well, that's where the confusion

Here's What They Found in Atom

NAME	WEIGHT (compared to electron)	ELECTRIC CHARGE
electron	1	negative
proton	1,836	positive
neutron	1,839	neutral
positron	1	positive
antiproton (?)	1,836	negative
neutrino	0	neutral
mu mesons	212	positive or negative
pi mesons	276	positive or negative
pi neutral meson	266	neutral
chi mesons	1,400	positive or negative
V mesons	800-1,100	positive or negative
kappa mesons	800-1,100	positive or negative
tau mesons	975	positive or negative
V particles	2,200	positive, negative or neutral
V ₂ particles	972	neutral
S particles	1,480	positive or negative
zeta particles	550	positive, negative or neutral

comes in. Small as they are—about 1/250,000,000 inch across according to a new measurement last year—atoms are largely empty space. Spinning around most of this space are electrons, exceedingly lightweight, negatively charged particles. In the middle is the atomic core—nucleus—crammed tight with the heavy neutrons (uncharged) and protons (positively charged). The core is astoundingly compact: it

contains nearly all the atom's weight but occupies only 1/2,000,000,000,000 of the volume; it weighs 480,000,000,000,000 times as much as water.

Unfortunately, electrons, protons and neutrons are not all. More parts to the atom keep cropping up. The score now stands around 21. How do they fit into Nature's master plan? Many of them don't—yet.

One that does is the meson. The famous Japanese physicist Hideki Yukawa predicted that this building block must provide the "atomic glue" which holds the core together. Otherwise all those positively charged protons in the core would repel each other, as like electrical charges do, and tear the core apart.

Caltech's Carl Anderson soon found mesons in cosmic rays, the mysterious stream of particles which continuously showers the earth from outer space. But these mesons did not fit Yukawa's theory. Not until years later was a second type of meson suggested, and quickly discovered in high-altitude cosmic rays. They seem to solve the glue problem, but leave Anderson's mesons a mystery.

The strangest of the "extra" building blocks is the atomic ghost, the tiny neutrino. It has never been observed and probably never will be. Having no charge and almost no weight, it cannot be recorded by Geiger counter or cloud

chamber. It must exist, however, to make the physicists' books balance. (If it didn't exist, some reactions would violate the fundamental law against destroying matter or energy.) And plenty of indirect evidence proves the neutrino a very real ghost. The latest tests, performed at the Hanford plutonium factory, clinched the case by detecting the end products of a reaction involving a neutrino.

The meson and neutrino were discovered because the pencil-pushing theorists told their dial-twisting experimental colleagues what to look for. Other building blocks the lab men turned up on their own to add to the confusion. The particles exist all right—their tracks are seen in cloud-chamber photos, their charge and weight can be measured—but why so many for no apparent purpose?

One mathematician answered last fall: there really aren't so many; they may all be simply different forms of one truly fundamental building block. His theory, however, involves six dimensions, two more than the Theory of Relativity.

New Atom Machine Uses AA-Gun Parts

Simpler solutions may come from new experimental machines announced last year. Stanford has put a detector on a 40-mm. antiaircraft gun mount to catch electrons bounced off atomic cores. This shows the placement of particles inside the core. First results indicate the core is not a solid ball, but cottony—dense in the middle but fluffy at the edges. At the University of California the "swindletron" promises an easier way to peer inside the atom. It gets its name from the fact that it seems to swindle Nature by shooting atomic bullets with twice the energy fed into it. And Brookhaven National Laboratory proposes another new kind of atom smasher, 10 times more powerful than its predecessors.

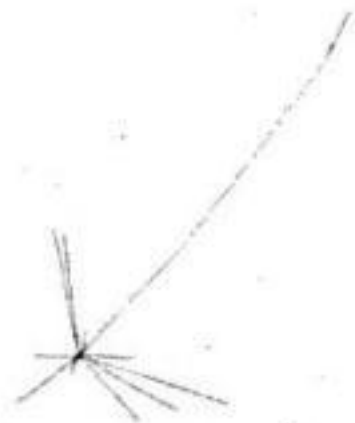
That the confusion will be ended—perhaps soon—few physicists doubt. But in the meantime the world is made of too many things.

END

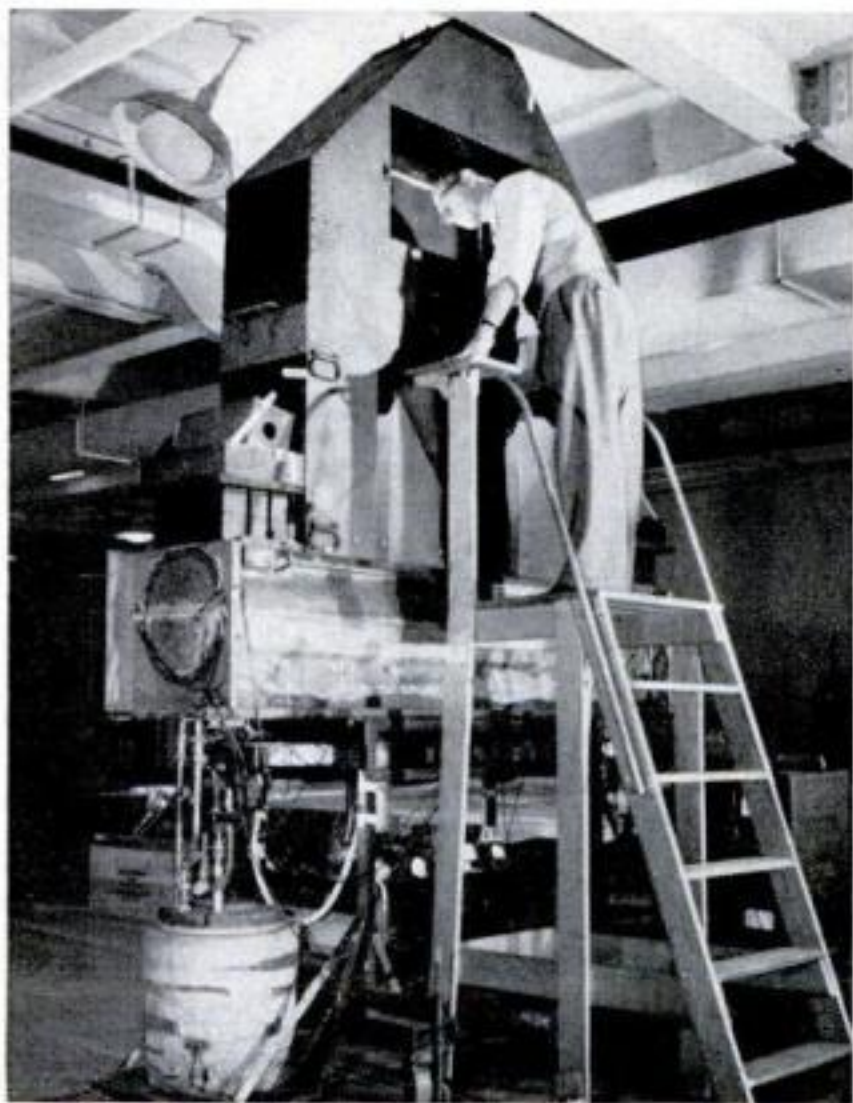
All You See Is Their Tracks



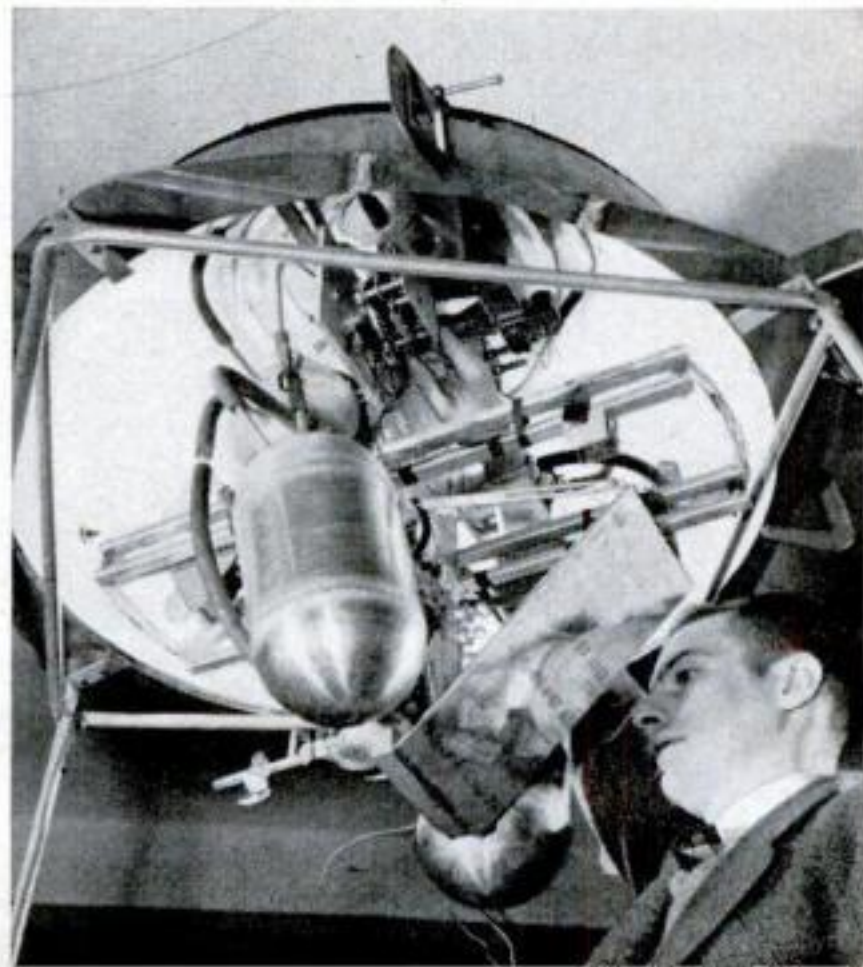
Charged pieces of atom leave vapor trails as they traverse cloud chamber.



Particles also make tracks in photographic emulsion. Example above is enlarged.



Seven-foot-long tank (left) is cloud chamber used at Brookhaven to record vapor tracks. Instruments (below) are sent aloft to check temperature, pressure for balloon flights that bring back photo tracks like lower one above.



P.S.

Last minute news & notes...

A MILLING MACHINE CONTROLLED BY A TAPE RECORDER will start making jet-plane parts this year. It is expected to double normal output. The control tape is recorded by running the machine through its operations manually. After that the tape need only be played back to make the machine produce the parts automatically.

RAINY WEATHER should make your car run more quietly, a Standard Oil expert told the SAE. His tests show that engines knock less on a wet, cool day with a low barometer reading . . . An acid neutralizer for crankcase oil, an aluminum-magnesium-alloy rod that fits in the drain plug, is being marketed through filling stations. The inventor, W. A. Johns of Dunellen, N.J., claims that the cylinders of one test car, examined at 125,000 miles, had been only half worn down to the first rebore. Another car, used as a control, was junked at 45,000 miles. . . . Jaguar regained the stock-car speed record when an XK-120M hit 172 for the measured mile in Belgium. . . . A new Indianapolis Speedway mark for stock cars was set by a '54 Chrysler that averaged 89.76 miles per hour during a 24-hour continuous run. On the straightaway it topped 120.

HIGH-FIDELITY PHONOGRAPHS, once limited to an exclusive fraternity of enthusiasts, are close to becoming standard home appliances. One indication is the skyrocketing sales of \$15-and-up diamond needles. Hi-fi fans are practically the only customers. One company reports a 400-percent jump for part of 1953.

BIGGEST SCIENCE HOAX is bared by discovery that "Piltdown Man" is a fake. Chemical tests, British experts report, prove that jawbone and teeth of an ape were doctored

with stains and file to pass for human relics 500,000 years old--then "found" in a Sussex gravel pit by an amateur geologist in 1911-13. Exposure of fraud is relief to savants, long puzzled by discrepancies with other finds. (Next month Popular Science Monthly will carry the story of an authentic discovery, a missing-link ape man.)

PILOT DOUBLES SPEED OF SOUND. A speed of 1,327 m.p.h. was reached recently by NACA pilot Scott Crossfield in the Douglas D-558-II Skyrocket research plane. At the 60,000-foot altitude, his speed was 2.01 that of sound.

ATOMIC ENERGY WILL HEAT SOME NEW BUILDINGS at the Hanford plutonium factory. The heat, enough to warm 1,000 average homes, will be extracted from water that cools an atomic furnace and transferred to the air going through the plant air-conditioning system.

FUME-LADEN CITY AIR is blamed for lung cancer by Dr. Paul Kotin of the University of Southern California. He found chemicals that cause mouse cancer in the exhausts from gasoline and diesel engines. Improperly adjusted or slow-running engines are the worst offenders, he says, and suggests that speeding up traffic might reduce lung-cancer deaths.

LESS TAX MONEY will be spent on research this year, the National Science Foundation reports (see chart), with still less scheduled to be spent in following years. The only exception is agricultural research, which will get increased allotments. Defense, however, still takes the lion's share, about three-fourths of the total.



Answers to Questions TV's 70 New Channels

New programs and new problems are both on schedule as UHF zooms television's air space.

By Robert Hertzberg

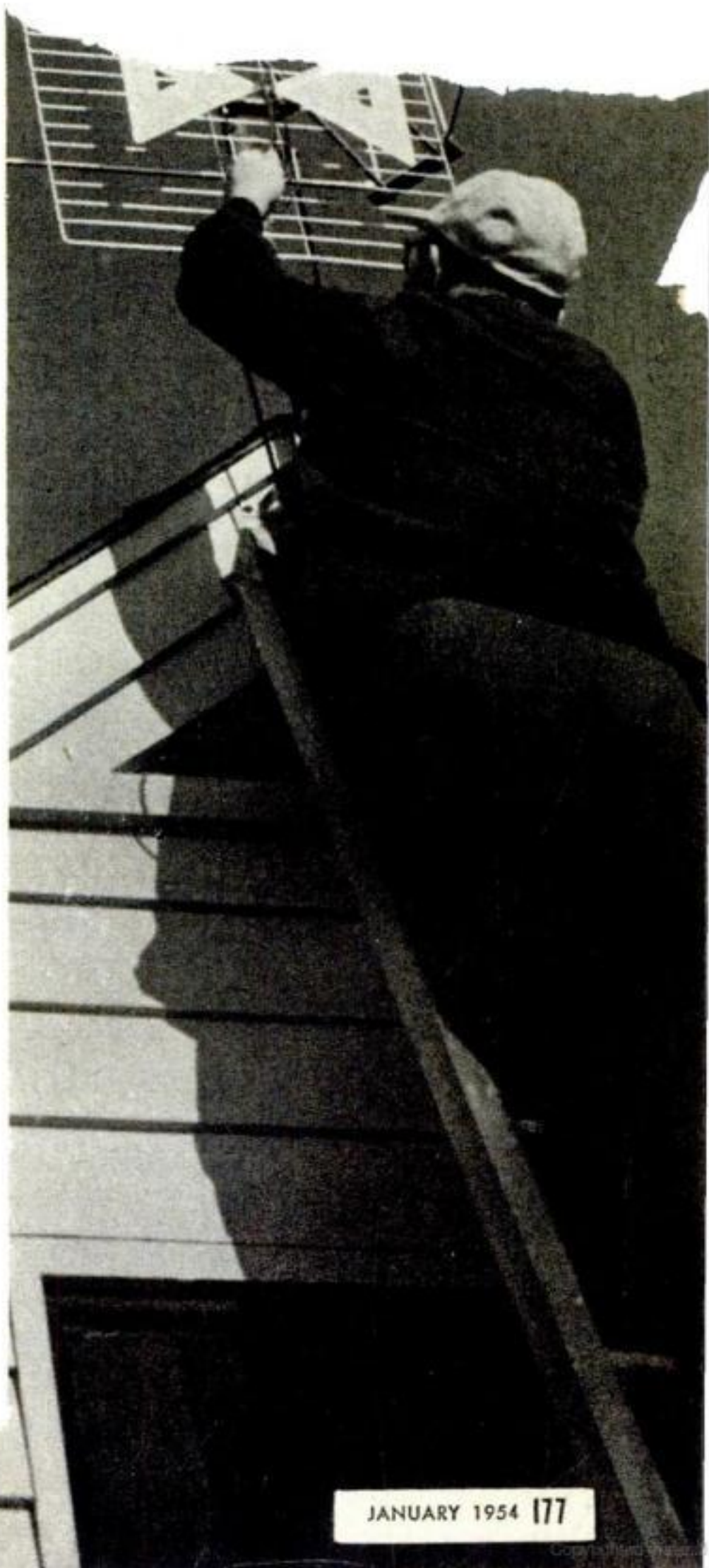
OUT of range of present TV stations? Or sore because there aren't more programs to choose among? Many of us fall into one group or the other—and in either case we're getting a break. More TV is on the way. Seventy new frequency channels have become available—nearly six times as many as there used to be.

Where does the new air space come from? Ultrahigh-frequency TV broadcasting (PSM, Aug. '50, p. 111) has graduated from experiment to reality. The new channels are in the frequency spectrum between 470 and 890 megacycles—well away from the dozen overworked very-high-frequency channels.

It will be a long time, the Federal Communications Commission believes, before all 70 of the new UHF channels are used up. In the meantime they will bring TV to new millions. They will also bring some new problems. For to make the most of what UHF has to offer you must know two things:

- How to adapt your receiver to it.
- How to tune it with the correct antenna.

The first of these is easy; the second, not so simple. Both are covered in detail in an easy-to-follow quiz starting on the next page.



that a UHF receiver needs proper antenna. Is there one kind of antenna TV?

The bow-tie antenna, used with a reflector screen as shown at left, is popular. Then there's the corner reflector, the V or fan, and the rhombic.

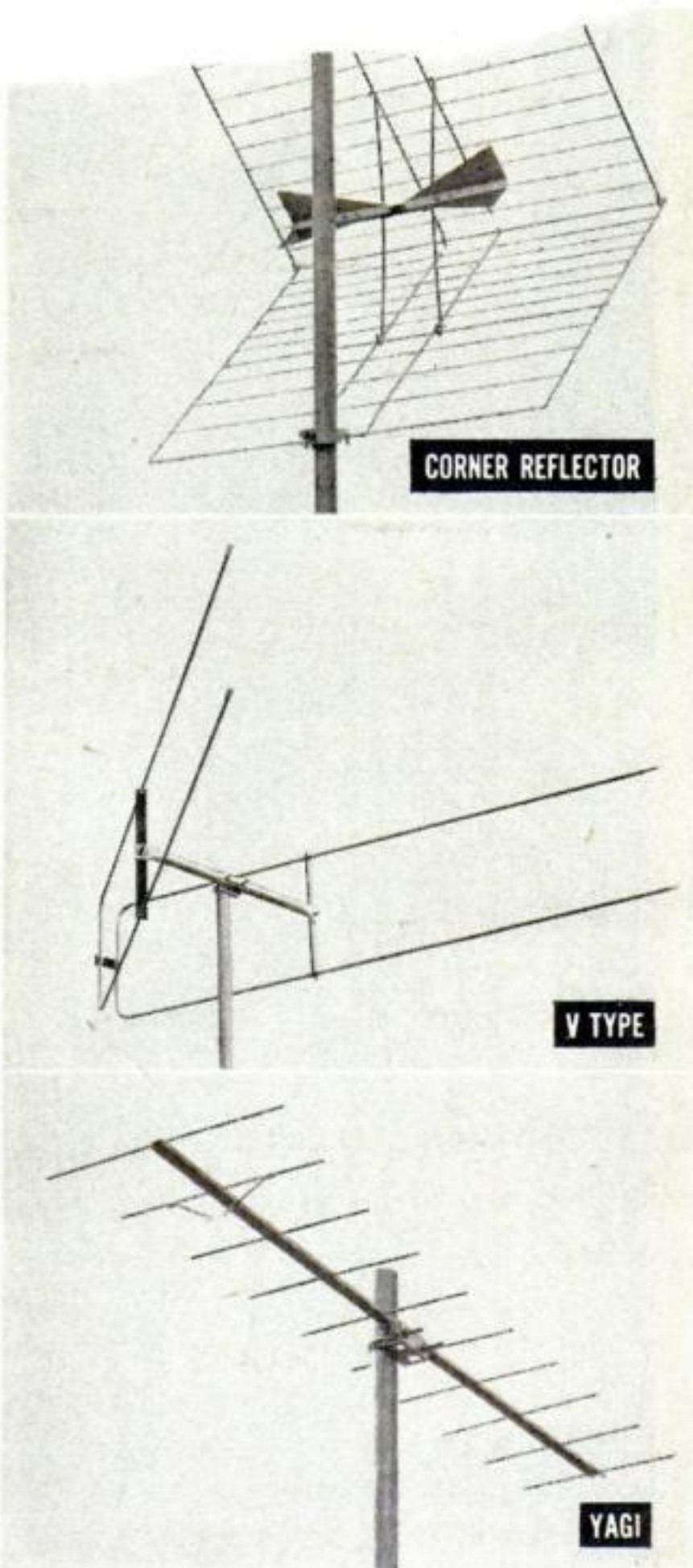
Q How do you use all these different kinds of UHF antennas?

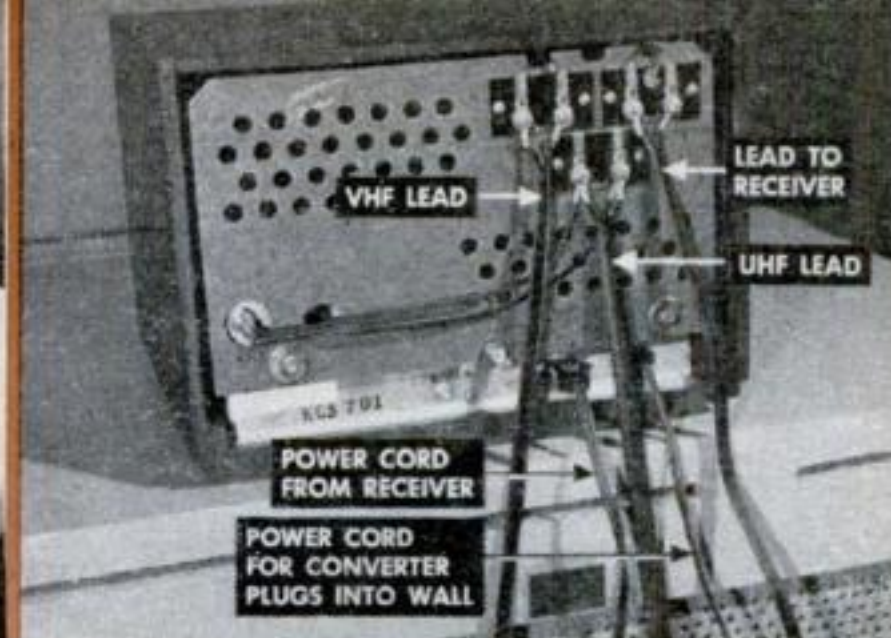
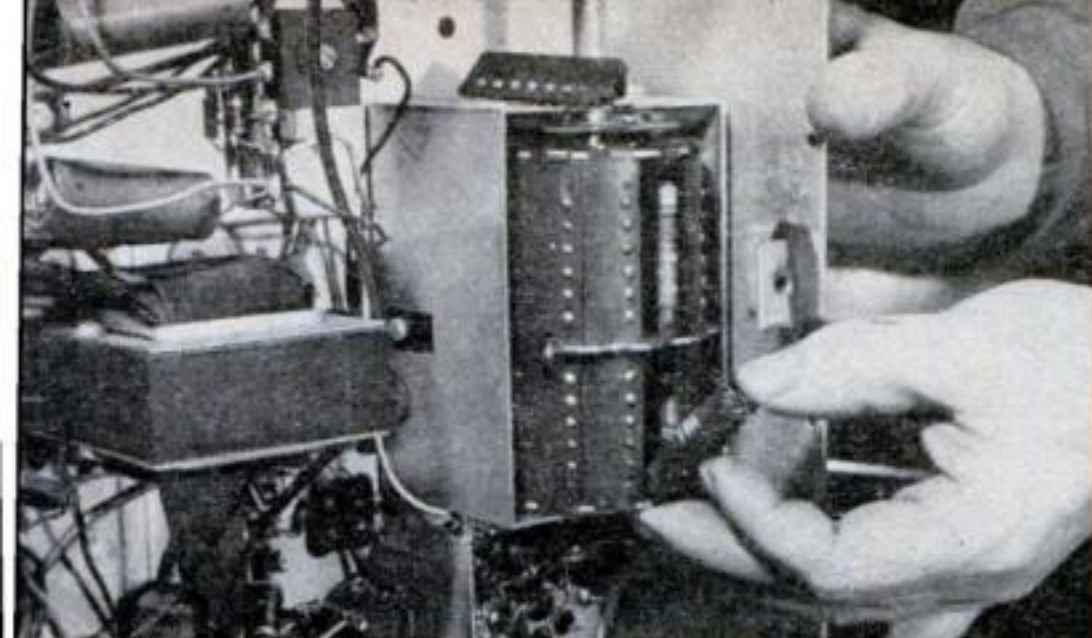
A Well, for people in the primary service zone, a bow-tie antenna with a flat reflector screen should do the trick. At somewhat greater distances, you may need an antenna with more "gain," one that extracts a stronger signal from the passing waves. The corner reflector, the V and the rhombic are next in popularity after the bow tie. All four of these antennas respond well to the whole UHF band, and are therefore called "broad band." For still more gain in weak signal areas, you can stack them—that is, put two or more one above the other or side by side. Most stacked antennas contain two or four elements, which are joined together with tie wires to act as a single antenna.

For the maximum effectiveness on only one channel or a group of adjacent channels, the yagi is extensively used in fringe areas. (Its name comes from its inventor, not its shape. It looks like a fishbone.)

Q How can I tell if I'm in the primary service area or in a weak signal area, so that I can pick a specific antenna to suit?

A Let's be honest about it: you really can't tell in advance. You can find out only by installing one antenna and checking your results. If you get good pictures right away, you're in luck. If you don't, be prepared to experiment either with the first antenna or one of a more advanced type. An excellent and untapped source of advice in this connection is the local UHF station that you are trying to receive. Its management is anxious to build up an audience, and is happy to pass along helpful hints and suggestions based on engineering field tests and observations.





Q *I have a fine VHF receiver. A UHF station is going up nearby. How can I bring it in—short of a new set?*

A If your set is not too old, have a service dealer replace unused VHF tuning units in the channel-selector turret with new UHF “strips,” as shown above. Each strip will be the correct frequency for one UHF station. This may mean expensive digging in the chassis guts. “Strip” conversion is okay if you are in a strong signal area—say within 10 miles. You can also use a converter.

Q *How about using one of these separate converters with my VHF set?*

A A separate all-channel UHF converter connected to your VHF receiver costs quite a bit but brings in a stronger signal than a strip conversion. The converter contains two or three small tubes to boost UHF signals. You can connect it in five minutes—and change from UHF to VHF and back at the flip of a switch. The same brightness and sound controls are used for both.

Q *We've had no TV but now a new UHF station will open here soon. What kind of TV set should I buy?*

A There are no receivers made exclusively for UHF. Full coverage of the 70 UHF and 12 VHF channels is a feature of practically all makes for 1954.

Q *Why do manufacturers provide for 82 channels when only a few are likely to be used in any one area?*

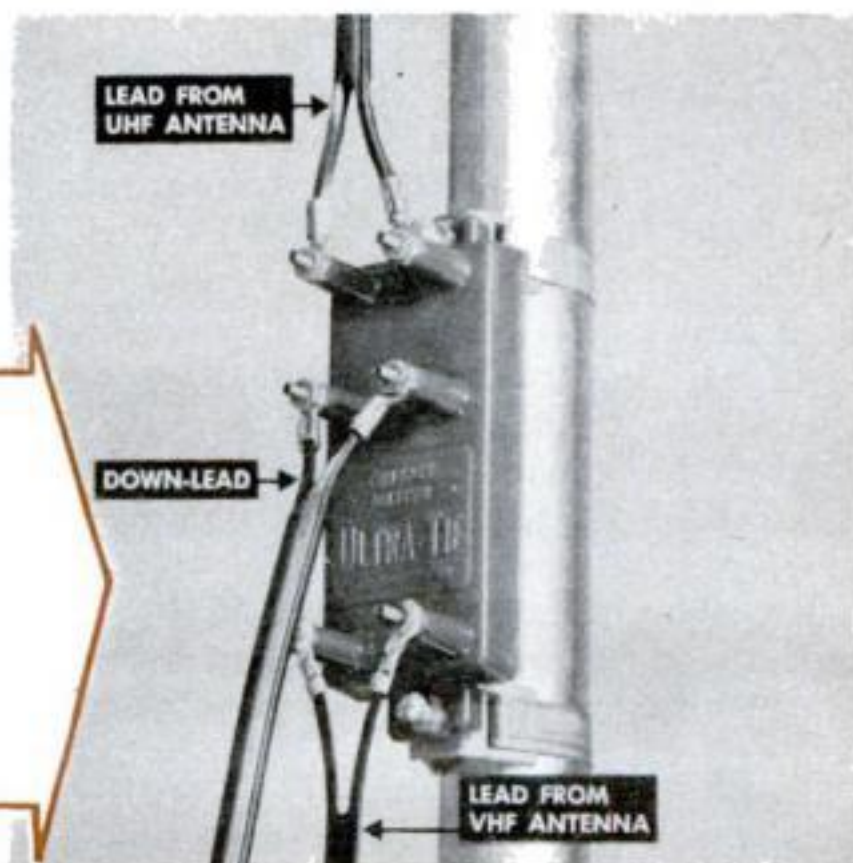
A “All-channel” tuning is a potent sales factor. Suppose you move six months from now to a city where the broadcasts are on different channels? Anyway, with one of the new tuning heads it's actually easier and cheaper to include full coverage than partial.

Q *A neighbor put both UHF and VHF antennas on one mast but he had to buy a couple of “isolating filters.” What are these for?*

A These devices keep the two kinds of signals from getting mixed together.

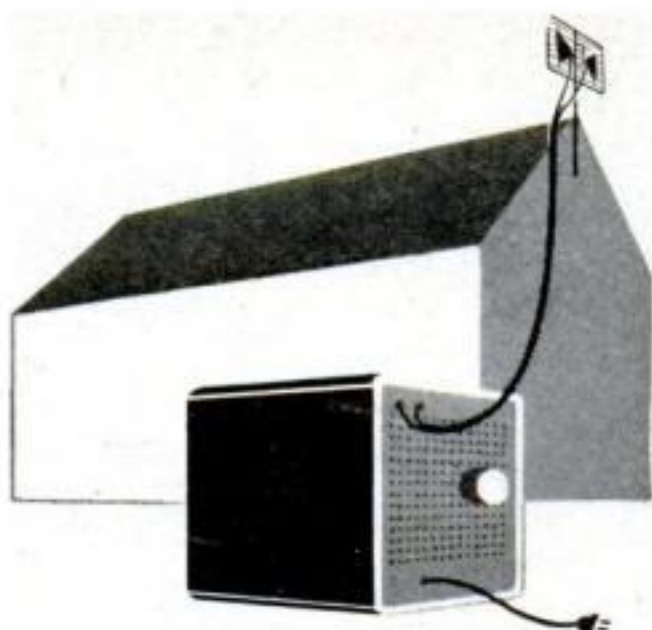
Q *Well, suppose I already have a VHF receiver to which I'll add a UHF converter. Can I convert the VHF antenna as well, to save the cost of a new one?*

A No, but there's no harm in at least *trying* the VHF antenna for UHF. In a strong signal area you may be pleasantly surprised by perfectly good pictures. If the stunt doesn't work, you'll need a UHF antenna.



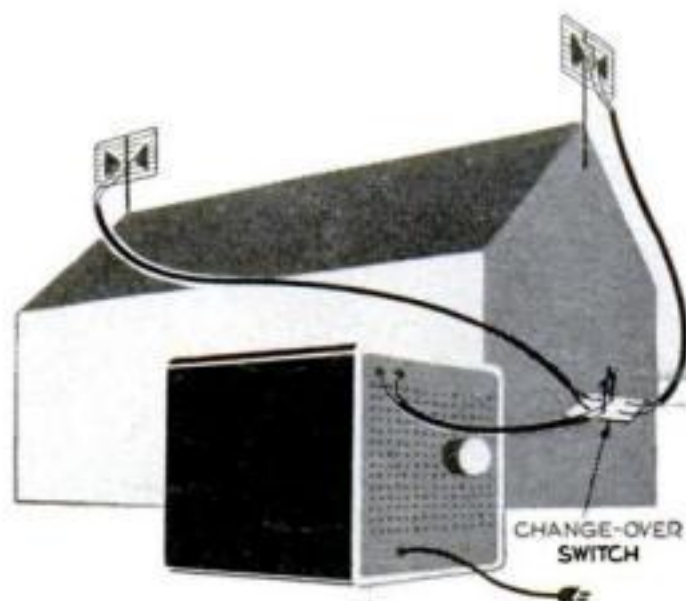
Please turn the page for more antenna questions.

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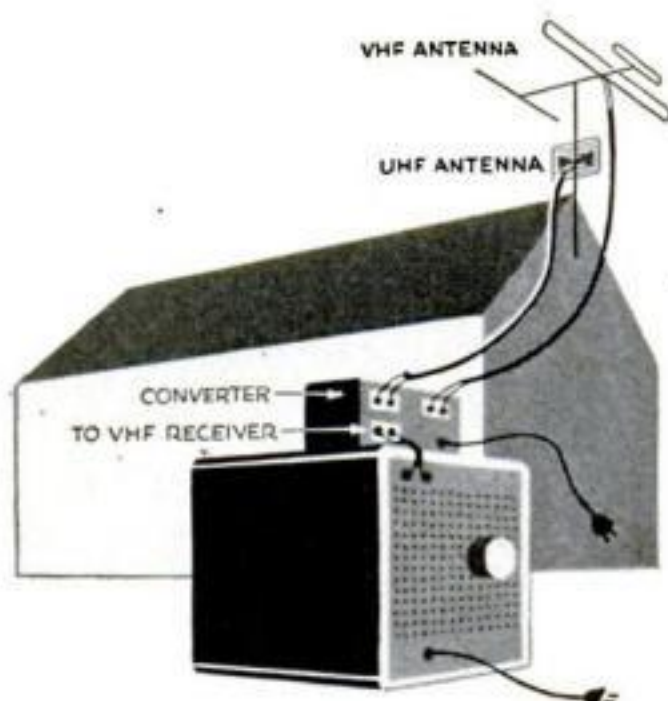
Q *There will be one UHF station in my area and no VHF. What's my antenna?*

A One fixed antenna of the various types we discussed earlier is all you need. Orient it toward the station. Be sure it is tightly fastened, that there are no flapping elements, and that the down-lead doesn't swing much—otherwise your pictures will flutter when the wind blows.



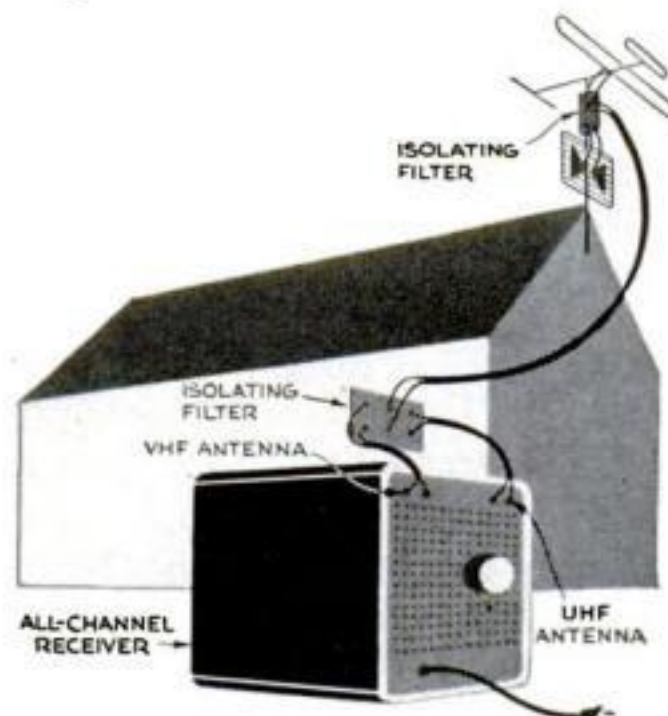
Q *Suppose another UHF station is built later, in a different direction—what do I do then?*

A Use two antennas and orient each one to one of the stations. Bring the separate leads into the house, and at the receiver position choose between them with a small change-over switch. This is the cheapest method when you have only two channels.



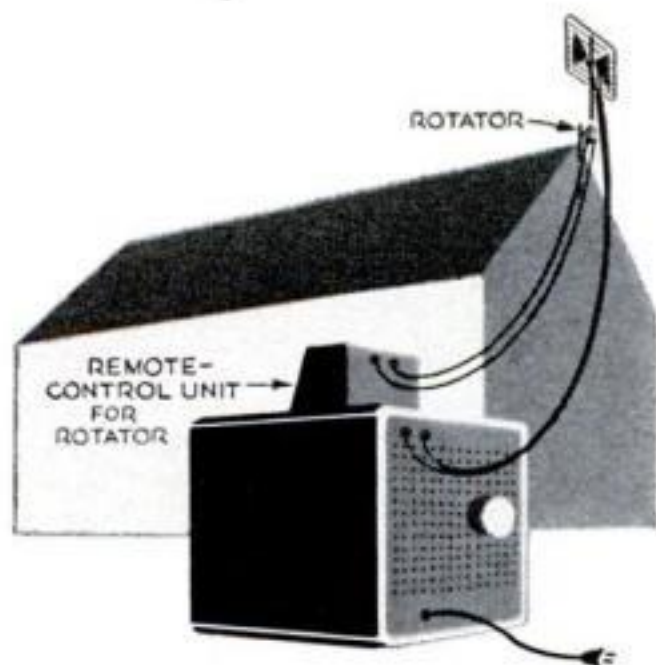
Q *I already have a VHF receiver and now a UHF station is coming. Can I put the UHF antenna on my VHF antenna pole?*

A Yes, try it. If it doesn't work, shift the UHF to another location. If you do use the same pole and your present VHF reception is satisfactory, leave the antenna alone. For the UHF antenna, run a separate down-lead of the new tubular kind, *not* the VHF flat-ribbon type. Connect the VHF and UHF leads to the marked terminals on the back of your converter or all-range set. If you use a converter, connect its output terminals to the antenna terminals of the VHF receiver. A switch makes the proper connections.



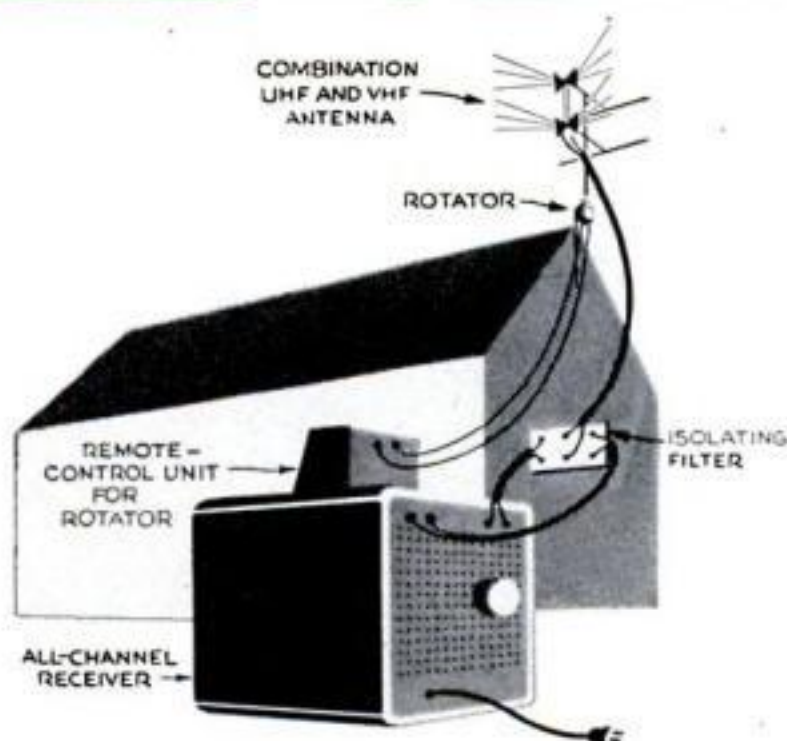
Q *What about those isolating filters you were talking about a while back, for this kind of job?*

A That's another way of using both kinds of antenna on the same mast. Replace the old VHF ribbon with a new length of tubular down-lead and use this one cable for both VHF and UHF. Then use one isolating filter on the mast and another at the converter. They have no controls and require no adjustments. Screw terminals enable you to install them quickly, either with a converter or an all-range receiver. Incidentally, you'll find one of the most important considerations in placing the antenna is to get it where it eliminates bothersome ghosts.



Q We expect several UHF stations in different directions. What do we do?

A For more than two stations, it's cheaper to have a motor-driven rotator on your antenna. Remotely controlled from the receiver position, this enables you to swing the antenna accurately to any station for maximum signals. Average price is \$29. You can install it yourself.



Q I live in a city that has both UHF and VHF stations scattered in the surrounding hills. I intend to buy a new all-channel receiver. What's the antenna for my needs?

A A combination job. In its usual form it consists of a bow-tie UHF element sitting in the center of a modified V, fan, or conical VHF element, with suitable reflectors. Two such antennas, stacked vertically, provide very high gain and directivity. A rotator is a "must," as the UHF and VHF signals will be arriving from several directions. And you'll find the rotator helps kill ghosts by enabling you to lose a weak reflection from one side without losing the main signal.

Q Can I do all this antenna work we've been talking about, myself?

A Sure. UHF antennas are much smaller than the VHF type that thousands of people have installed themselves. But you'll need help in orienting the antenna. While you're up at the mast or on the roof turning the aerial, have a friend at the receiver reporting on the picture. Don't be discouraged if the first antenna location doesn't work. Try others, wherever you can get a foothold. The highest point of the house isn't always the best. UHF waves bounce around peculiarly and you may pick up a favorable reflection at such an unlikely spot as a ground-floor window.

Q I am using an indoor antenna for VHF, and getting good results. Can I use a similar antenna for UHF?

A Indoor antennas for UHF haven't been too successful—but you can try it.

Q Can window-type antennas be used for UHF?

A Again, you can tell only by trying. They're usually more effective than indoor ones.

Q How close must I be to a UHF station to get satisfactory pictures?

A The best UHF reception comes within a 10-to-15-mile radius in flat terrain. Acceptable pictures are received up to 30 or 40 miles. Freak reception can be expected sometimes in some places much more distant. These distances are a good deal smaller than with VHF. For one thing, UHF stations are not using as much power yet. Also, UHF waves are sharper than VHF and do not seem to fill in around obstructions in their path to the receiver, which makes the antenna position very important. UHF transmission seems to be better at night than during the day, and in hot, humid climates than in cold, dry areas.

Q I had a lot of trouble getting rid of ghosts on my VHF set. Will the same problem arise on UHF?

A Probably—and it may be even worse because the ultrahigh frequencies are more readily reflected.

Please turn the page for more antenna questions.

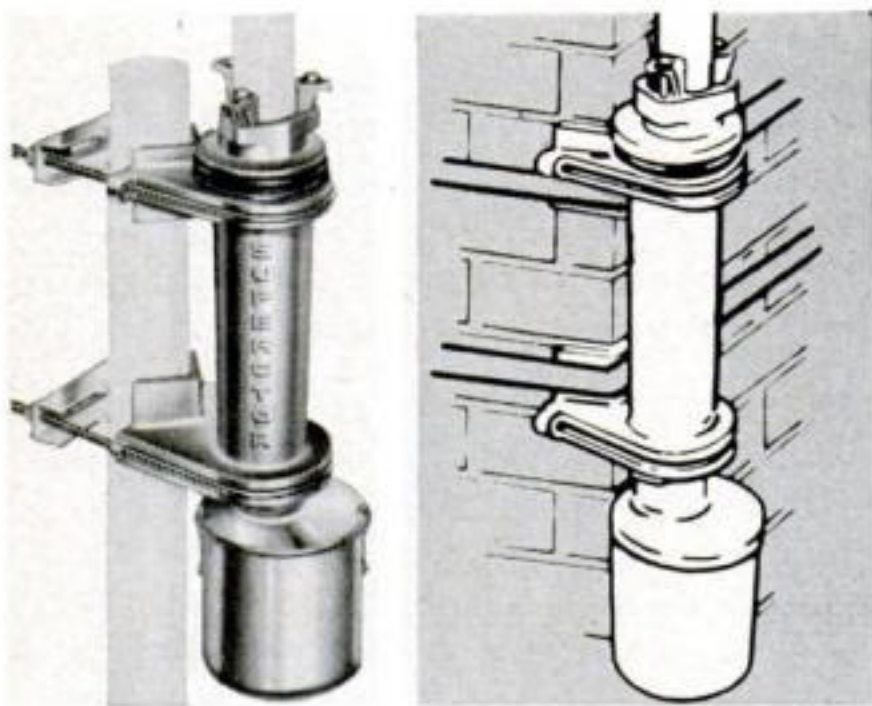
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Q During and after a rain, my neighbor's UHF receiver seems to lose its pep. At times the pictures just gradually disappear. When the air dries, they are fine again. What does this?

A Probably a short circuit across the terminals. This can result from water accumulating on a solid insulating block holding the terminals. This trouble was widespread in Portland, Ore., about a year ago when one of the first UHF stations went into operation there. Most newer antennas have free-space terminals and are not vulnerable at this point. Water seeping into a hollow downlead that is improperly sealed can also cause signal loss.

Q Will I be able to receive color on a UHF receiver?

A On a color UHF receiver, yes—if color programs are being transmitted by your UHF station.



Remote-Control Antenna Locks

HANDY for VHF TV, a remote-control antenna is pretty essential when UHF stations start popping up around the horizon. The new Superotor is said to tune to half a degree and stay there—thanks to a worm gear that locks the shaft against drift while a brake keeps the motor from coasting. The motor can be quickly detached from the base as a unit, for servicing. As shown above, the Superotor's mount can be used with a stub mast or fastened directly to a chimney, with the drive unit below the crown away from corrosive smoke. Leader Electronics of 2925 E. 55th St., Cleveland 27, makes the antenna.

Q On my VHF receiver I am troubled frequently by interference from automobiles. Will I have this on UHF too?

A Probably not. Most of the interference created by sparking electrical contacts seems to be lower in frequency than UHF signals. In some areas saturated with random interference from heavy machinery, UHF delivers clear, sharp pictures where VHF produces only badly smeared ones.

Q How many UHF stations are on the air?

A As of November 1, 1953, there were actually 94 stations in operation. The FCC has issued construction permits for 180 more. Check your local newspaper for news of a forthcoming station in your area.

Build your own converter to get new UHF stations in addition to regular channels on your present set. A unit you can make without special instruments will be described in Popular Science Monthly next month.



Knob Tunes Both Antenna Arms

You just twiddle a knob to tune the twin telescopic arms of the indoor antenna above. The result, says the maker, is a continuous tuned circuit that produces the maximum signal output from each channel—and less mismatch and fewer fuzzy pictures. The base is weighted to make the unit difficult to tip over. The device is made by Radio Merchandise Sales of 2016 Bronxdale Avenue, NYC.

▶▶▶A neutral-tinted safety glass reduces brightness haze and makes sharper pictures on a new TV screen, reports Libby-Owens-Ford. Unwanted light peaks are neutralized.

Winter Aids from Auto Row

1. Tow Chain Hooks on Bumper.

It's seldom that a push will help a car that's really stuck in deep snow or ice. This 10-foot tow chain has two hooks on each end that catch the top and bottom edges of the bumper of the tow car and the car being towed. Tension on the chain keeps the hooks engaged. The chain is packed in a red bag that can be used as a distress signal.



2. Rotating Brush.

Save your hands from frostbite with this auto-washing brush. Water power spins the inner brush at 1,500 r.p.m. to remove slush, mud and ice-melting chemicals. A four-foot handle attaches to garden hose.



3. New Battery.

Long life and great recuperative powers are claimed for a new auto battery, called the Life-Time battery, sold with a six-year guarantee. The manufacturer ascribes its strength to special flexible separators (shown in photo) that outlast the wooden ones often used. Cells are said to recharge themselves in one minute, without help from the generator, after being completely run down by cranking a stubborn, cold engine. It can be had for six- or 12-volt systems.



4. Three-Way Brush. Here's a tool that will brush snow off your car, scrape sleet off the outside of the windshield and squeegee fog off the inside. The scraper is detachable so that you can also use the brush for sweeping out your car's interior.

5. Gun Gets You Moving on Ice. Pumped by hand like an insect sprayer, this gun shoots a spray of ice-melting crystals that help get your car on its way. The crystals stay put, providing traction as they soften the ice. The gun, called Traxion, has a 10-inch cylinder that is said to contain a full season's supply of crystals.



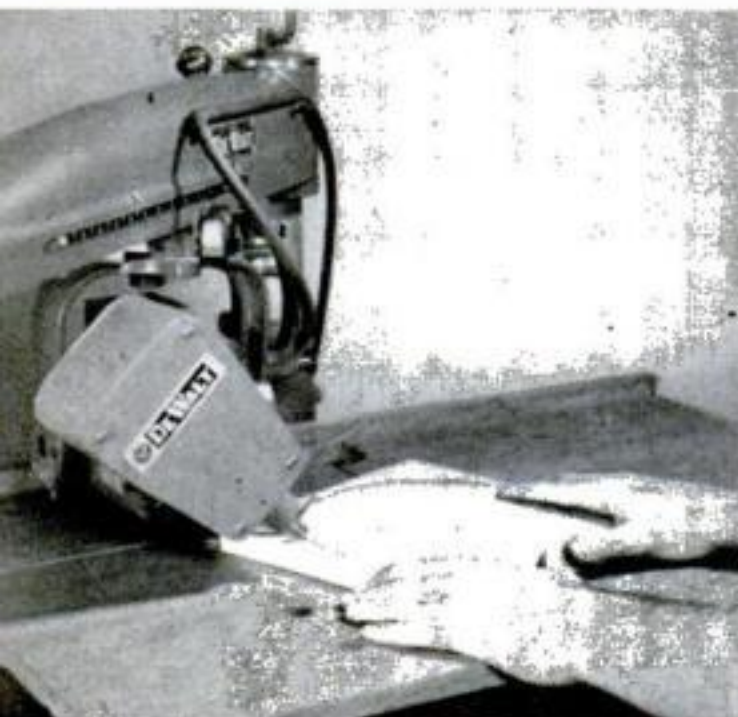
Further information on these items can be obtained from: 1. S. G. Taylor Chain Co., Hammond, Ind.; 2. Henrie L. Miller Co., Manti, Utah; 3. Continental Mfg. Corp., 10407 West Washington Blvd., Culver City, Calif.; 4. Alwin Products, Milwaukee, Wis.; 5. Dorothy Damar, 900 Damar Bldg., Newark, N.J.



New Tools



1. 5-in-1 Shop Tool. A single motor on a sliding mount powers five separate tools in this combination shop. In vertical position (at left) the motor serves as drill press, and in horizontal position as sander and headstock for a lathe. A table saw and jointer (in foreground) are arranged in front of the lathe so they can be belt-driven by simply sliding the motor along the lathe bed. All five tools fit in a 3'-square work space.



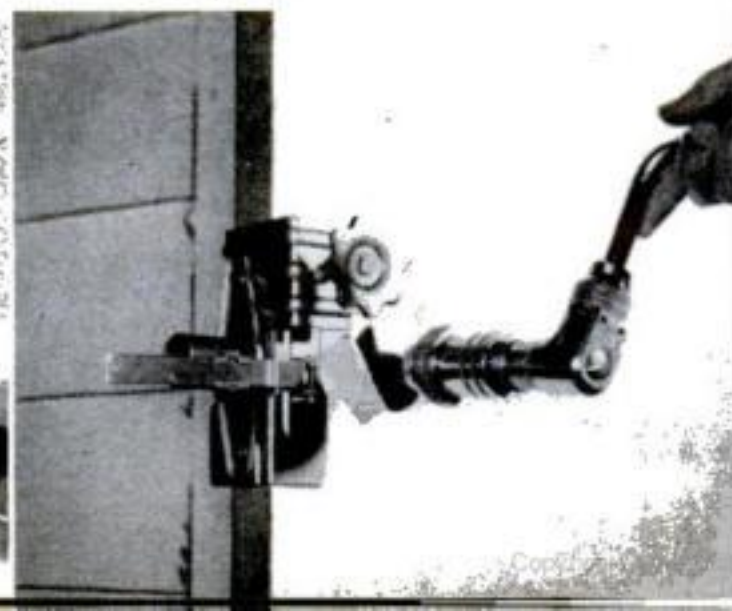
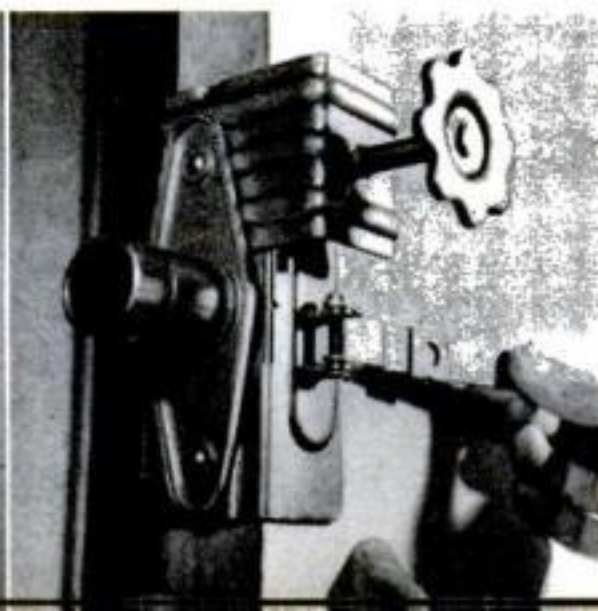
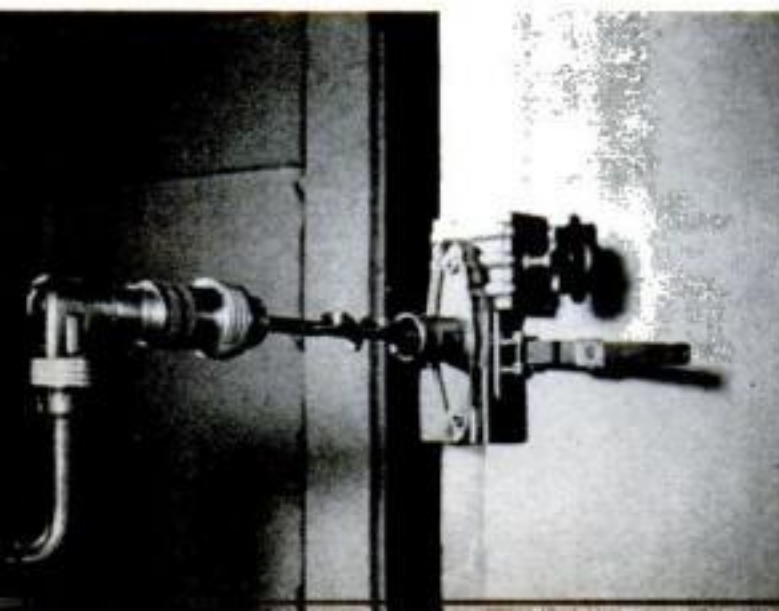
2. Radial Arm Holds Saber Saw, Lathe.

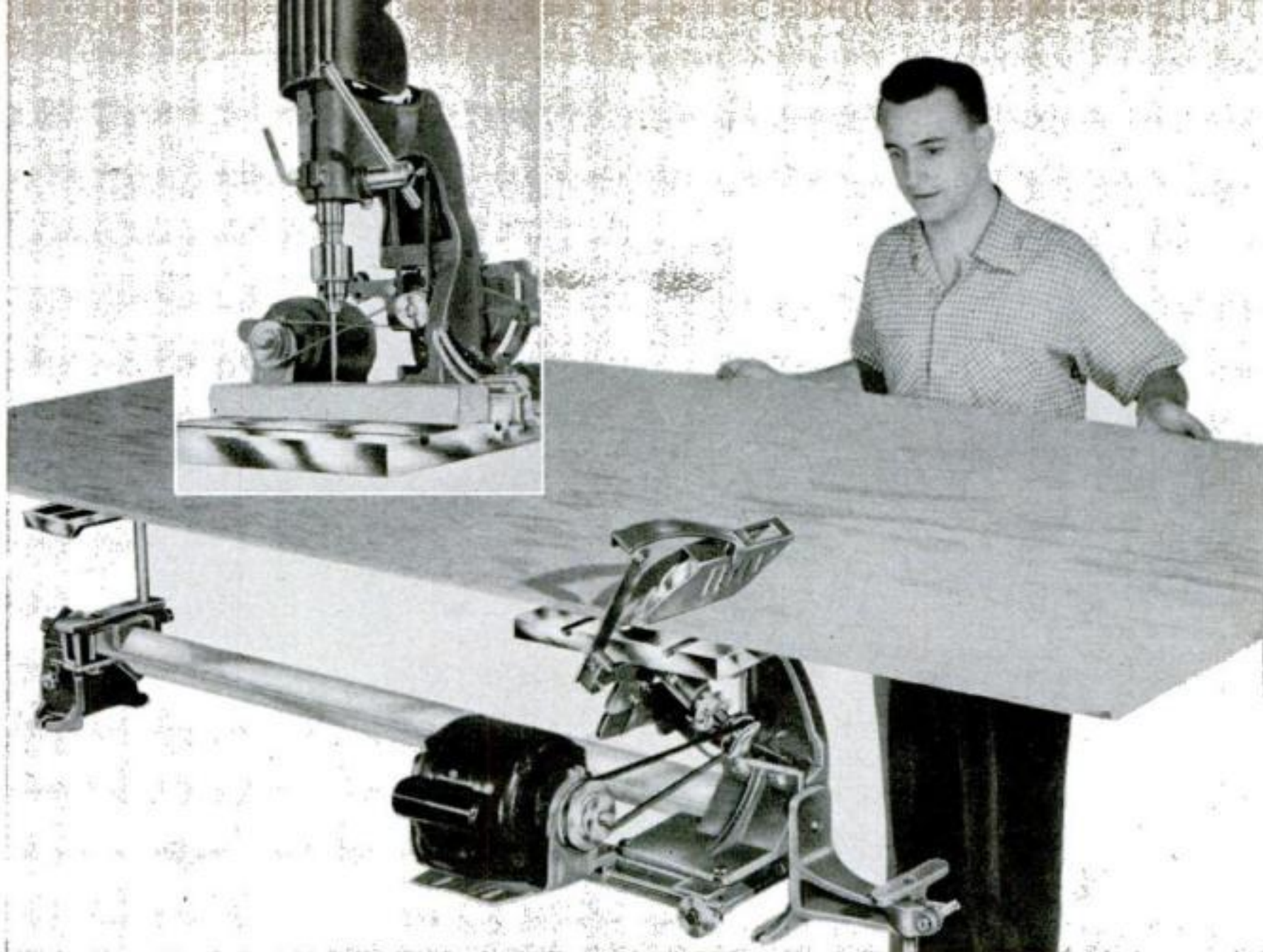
Two new attachments for this radial-arm saw are a saber saw, shown at left above, and a lathe, at right. The lathe, clamped to the saw table and belt-driven by the motor, will take stock up to 12" in diameter and 37"

long. It can also be used as a separate tool with its own motor. The saber-saw attachment mounts directly on the radial-arm motor, and can be tilted up to 45° to either the right or left. The saw will cut stock up to 2" thick.

3. Jig Speeds Lock-Setting. The complicated task of installing a door lock can be done in only 15 minutes with this jig. The jig is first clamped to the door and the drill inserted in the barrel (left, below),

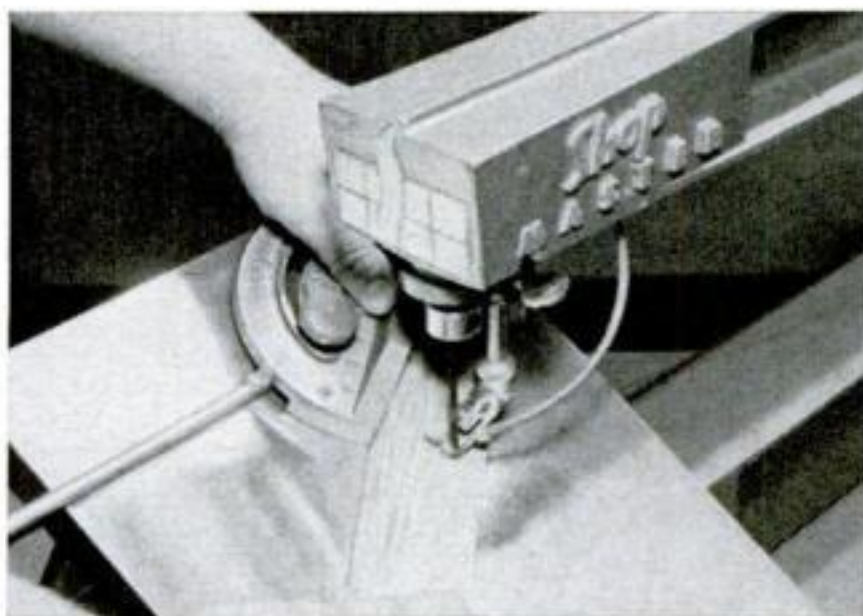
which guides the bit for boring the end hole. A sliding pointer is then set to the correct lock size and pressed into the door (center), quickly marking the point for drilling the side hole (right).



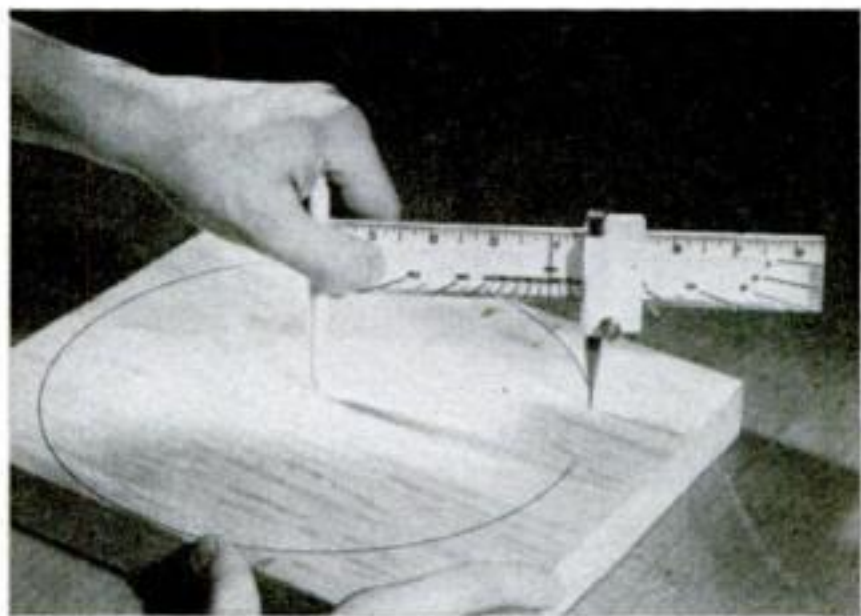


4. Multipurpose Tool Has Tilt Arbor. A trick suspension on this new low-cost combination shop tool provides a fully tilting arbor for sawing, sanding, grinding and polishing. The motor remains horizontal, but rides on a sliding carriage (above) that

moves sideways as the arbor cradle is tilted, always keeping the belt in line and minimizing wear. With the drill-press headstock in place (inset), the tool will also do wood turning, metal spinning, and vertical or horizontal drilling.



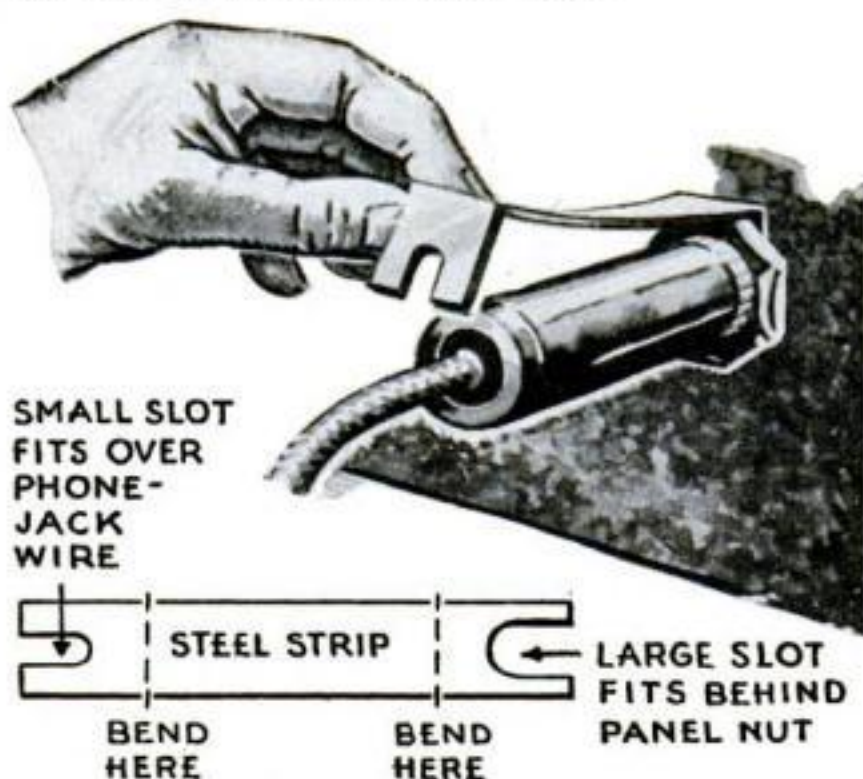
5. Jigsaw Has Built-In Motor. You don't have to set up any belts or pulleys to drive this jigsaw—it has its own rotary motor built right into the base. The saw has a 20" throat and will cut up to 2" stock. A tilting table and combination rip fence and miter gauge permit ripping, crosscutting and making compound miters.



6. Compass Does Four Jobs. This inexpensive plastic drawing tool has a ruler on one edge and a protractor on the other. As a compass, it scribes circles up to 17" in diameter and, with a stylus in place of the pencil, will mark metal and plastic. With the pencil holder removed, it serves as a small T square.

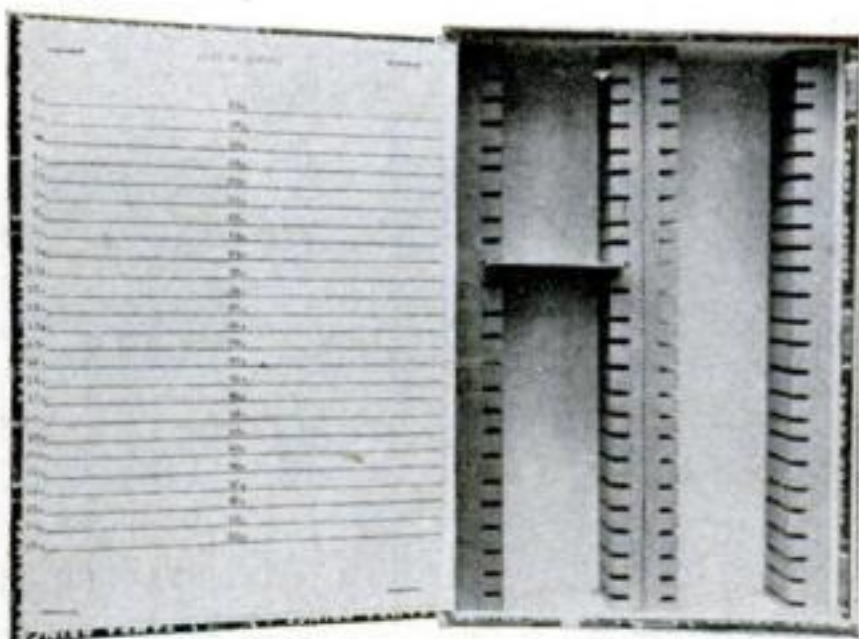
Further information on these products can be obtained from: 1. Heston & Anderson, 620 Kirkwood Ave., Fairfield, Iowa; 2. DeWalt Inc., 3046 Fountain Ave., Lancaster, Pa.; 3. Schlage Lock Co., Bayshore & Blanken Ave., San Francisco; 4. Plana Centric Power Tool Co., 20 Boylston St., Boston 16; 5. Shopmaster, Inc., 1214 So. Third St., Minneapolis, Minn.; 6. Ambi Corp., Box 39, Whitestone 57, N.Y.

Jack Is Locked in Place

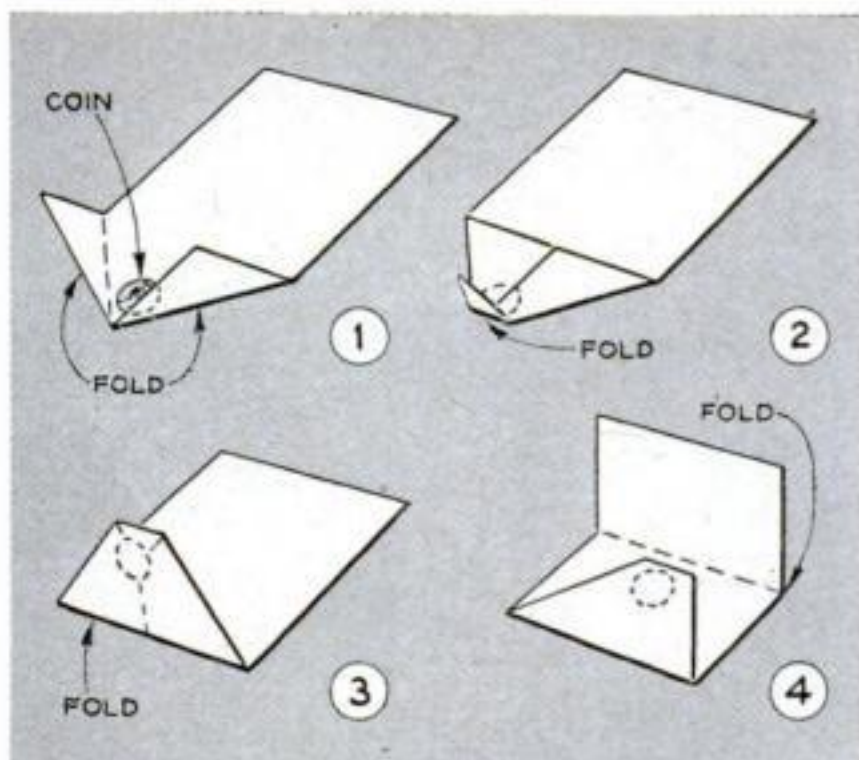


IF A phone jack pulls from its receptacle when given an unexpected tug, make a locking clamp from a strip of spring steel about $\frac{3}{8}$ " wide. Cut U-shaped notches in each end of the strip, bend as shown and slip one end behind the receptacle nut. When the jack is plugged in or removed, lift the end of the clamp to allow the body to pass.—*Phil McCafferty, Fort Bliss, Tex.*

Cigar Box Stores Slides



FOUR strips of seasoned hardwood with evenly spaced slots cut in their facing edges turn an old cigar box into a handy slide box for 35 mm. transparencies. Twenty-five parallel slots are made in a single block of wood—a bench saw will cut them wide enough to receive cardboard mounts—and the block is then passed through the saw lengthwise to provide four matching strips. Glue or nail the strips in place, attach a table of contents to the lid, and you have a trim container which serves as well as the most expensive commercial slide box.—*W. A. Campbell, Athens, Ga.*

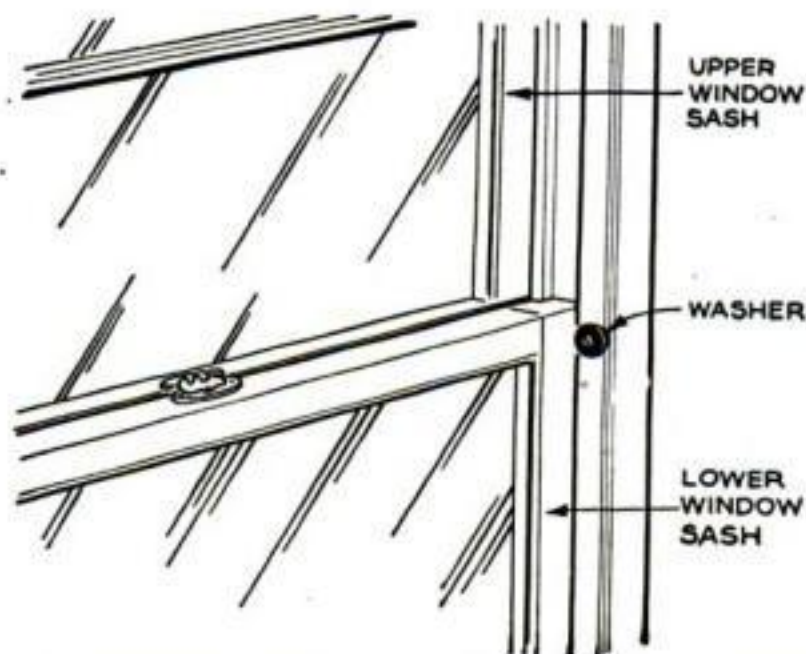


Letter Serves as Coin Mailer

FOLDING the bottom of a sheet of letter paper, as shown in the accompanying sketches, makes it a handy coin mailer. It will keep the coin in one place, near the center of the letter, and insure it against loss when the letter is opened.—*E. R. Seager, Long Branch, N. J.*

►►► Instead of spending time cleaning a paintbrush that you'll use next day, wrap it well in aluminum foil. This will keep it moist overnight.

How to Stop Window Rattle



A WINDOW sash that chatters in its casing can be quieted by slipping two faucet washers over wood screws large enough to act as snug axles. Then drive the wood screws into the window frame at points where the washers press firmly outward against the side members of the lower sash. Pressing the two sashes together stops the rattle, and the rotating action of the washers lets you raise and lower the windows easily.—*Howard E. Moody, Upper Jay, N. Y.*



3 Dozen Ways to Use Tape

Projects and repairs are easier with tape to lend a hand. Use it in place of glue, paint or rope.

By Darrell Huff

IT'S an impressive sight—one car yanking another up a hill with nothing connecting them but a slim line of white tape an inch wide and scarcely thicker than paper.

But don't doubt your eyes. The sticky tapes that manufacturers call "pressure sensitive" are remarkable things today. That's why they can perform many useful tricks around your home, shop and car.

Each particular tape was made with a special purpose in mind, but each can do a variety of jobs—many overlapping into the duties of other tapes. Some were made for strength, others for beauty. But the strong one may have just the right texture for your particular job, while the pretty ones often have all the strength you'll need for other jobs (except towing cars, of course). Each has a place in your shop.

Filament Tape

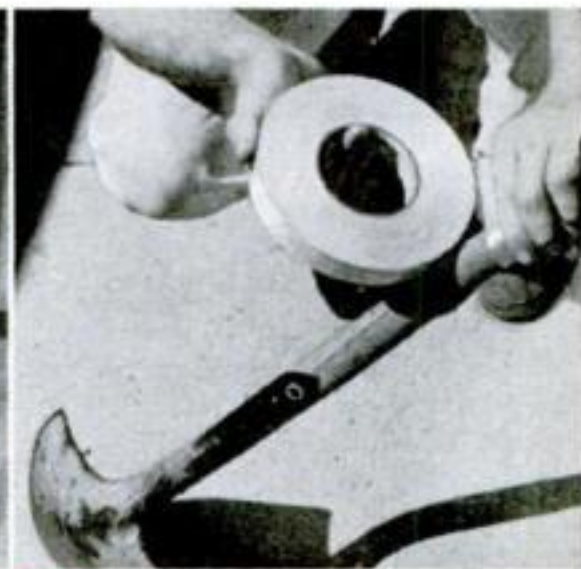
Strands of rayon or glass fiber embedded in the adhesive backing make the strongest tape in the world. Only 1/100 inch thick, a piece an inch wide has a tensile strength of 180 lb. (rayon) or 500 lb. (glass fiber).



1 Unbelievable tow chain, made from strips of filament tape, hauls stalled car home. Tape is resilient enough to take shock of sudden strain without snapping.



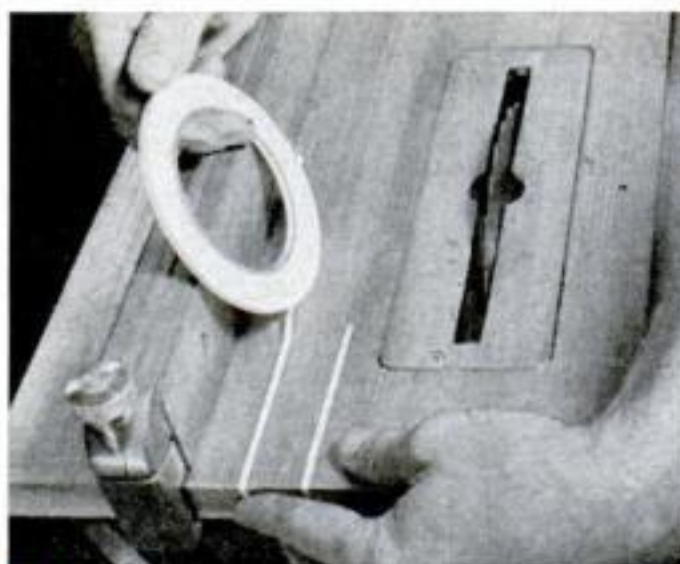
2 Spanish windlass, made by wrapping tape around chair legs, makes handy clamp for gluing loose rung. Tape is tightened by twisting with short stick.



3 Broken tool handle will see lots more service if wrapped with this tough non-tearing tape, provided break is long one that overlaps.

Cellophane

Usually called *Scotch Tape*, a roll of this type can be found in almost every home. It comes clear and transparent, or in many bright colors. With it you can repair almost any small household article that might get broken. Its transparent quality makes it a smudge-proof covering for all sorts of inked or penciled labels.



4 Mark fence settings with $\frac{1}{8}$ " cellophane tape when making repeat cuts of different widths. Strips of different colors can be used to key the settings. Tape is so thin and hugs table surface so tightly that fence slides over it.



5 Apply it as decorative striping in a fraction of the time it would take to paint on stripes. Above, water line of toy sailboat is marked with tape of contrasting color. Coat of varnish over tape makes application permanent.

Plastic Electrical

This black tape, made for electrical purposes, is waterproof and has high insulating qualities. It takes the place of both rubber and friction tape. It also makes a waterproof patch on overshoes and is a durable wrapping for golf-club or tennis-racket handles.



8 Insulate handles of pliers to make them shockproof by wrapping with electrical tape until all metal is covered. Use it on screwdrivers, too.



9 Quick repairs of garden hose are a good deal more lasting if plastic tape is used. Water doesn't soften it or make it give up its grip.



10 Numerous car uses make it a must in your tool kit. Use it to waterproof wiring, repair frayed insulation or patch a cracked distributor cap.

Double-Coated

This is tape with adhesive on both sides. It comes in two types: paper and transparent cellophane. Aside from such obvious uses as mounting snapshots, you'll find it very useful to sandwich together sheets of plywood for multiple sawing or to fasten on a pattern.



14 Photo enlargements can be made without an easel and with no margins. Tape holds the paper flat.



15 Felt is attached to base of lamp with this reliable tape; it sticks to almost any surface. Rough surface of felt, slick surface of lamp prove it.



16 Wall becomes copy easel with two-sided tape to hold picture or page in place invisibly. Thumbtacks, pins or clips are not needed here.

Photographic

Absolutely opaque and flexible, this tape was made for the darkroom. Use it to fasten negatives to printing frames, for masking or for repairing hinged flaps on film holders.



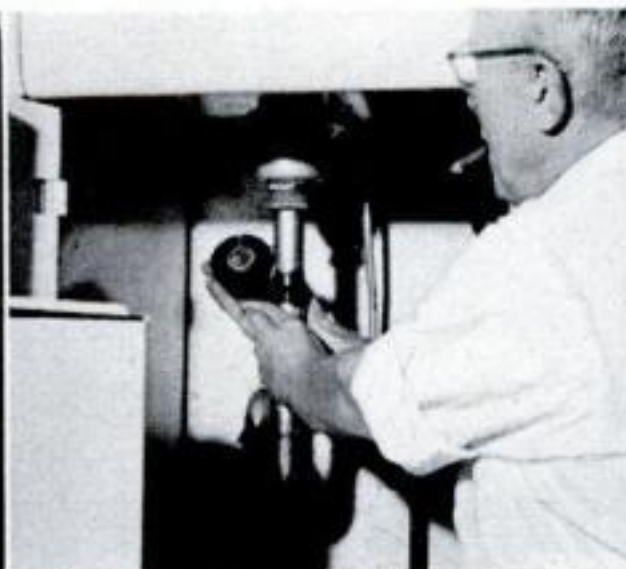
6 Leaky camera bellows needs a light-tight, flexible, hard-sticking tape. Photographic tape fills the bill. Here it replaces unsatisfactory repair job that had been made with white adhesive tape.



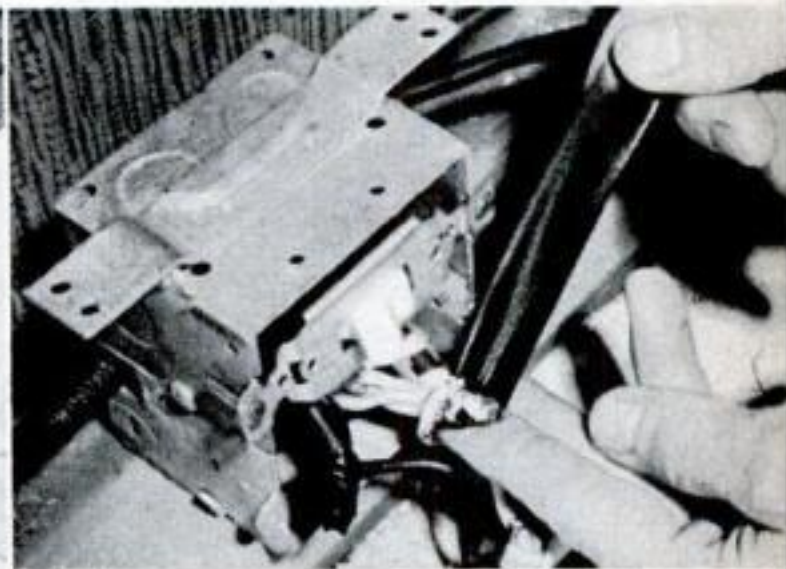
7 Making darkroom really dark, photographic tape is used to seal light-leaking cracks where wall meets ceiling. Use it, too, for binding edges of glass safelight filters.



11 Keep out the weather by sealing the glass with this waterproof tape. Use it on storm sash or your car windshield; its black color makes it inconspicuous.



12 Patch pipe that is not under pressure, such as this kitchen-sink trap. It beats ordinary tape (to say nothing of chewing gum) for a lasting repair.



13 Primary job is electrical work. It wraps wires without bulk—a desirable feature when working in well-filled junction or switch boxes.

Plastic-Film

Tough, flexible and much thinner than the black plastic tape used for electrical work, this tape is made 1/4" to 4" wide and comes in many bright colors. It will do most jobs that other tapes can do and do them better, but because of its exceptional flexibility, it is best suited for irregular shapes.



17 Inflatable plastic toys are best repaired with plastic-film tape. Its thinness, flexibility and bright colors make it ideal for such jobs, as well as decorative uses: adding stripes to boats, metal awnings or sporting goods.



18 As floor marker, it keeps car in its allotted space, guides your wife down the driveway and marks off shuffleboard or badminton court on basement floor.

Metal

Two types are available: aluminum-foil and lead. The first is for use with aluminum in other forms. It is the natural sealing agent to use with aluminum-foil insulation; it forms an excellent moisture-vapor barrier. Lead tape is heavier and very moldable. You can shape it to fit almost anything. It, too, is a moisture seal.



19 Aluminum flashing is made watertight with aluminum-foil tape. Tape can be had in $\frac{1}{2}$ " or 1" width.



20 Iron pipe passing through sheet aluminum is natural joint-sealing job for lead tape; its inertness makes it desirable for dissimilar metals.



21 Decorative uses for lead tape will be of interest to the craftsman. Here it is being used to simulate metal strapping on blond-finished box.

Masking

Every shop needs masking tape. Its big job, of course, is to produce a clean edge when painting. Two strips spaced side by side let you paint a clean, crisp stripe. Its color is tan and it is fairly heavy, making it an ideal cushion when attacking chrome pipe or parts with a pipe wrench.



25 Any auto-painting job calls for masking tape to protect the chrome parts. Use it, too, for making a clean division between two colors. Bring it in the house for many two-tone paint jobs that come up; it'll give your work a professional look.



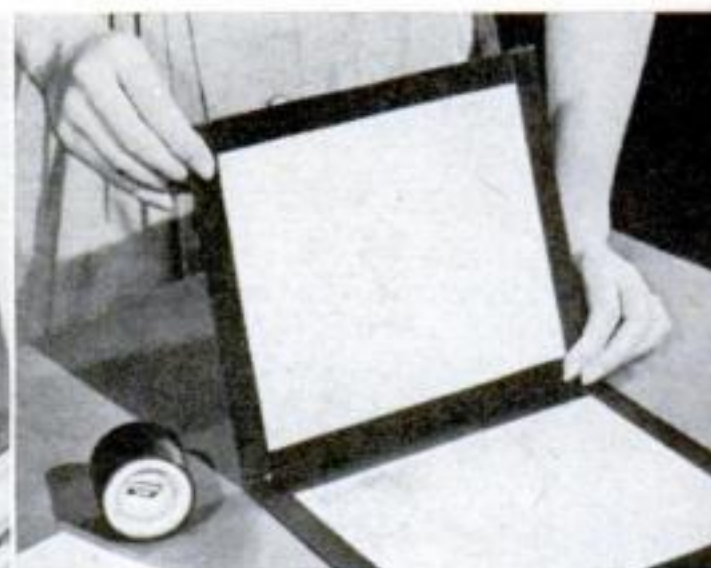
26 Use it on moving day to hold drawers shut or cabinet doors closed. Bind a protective cushion of newspaper around fragile china or expensive bric-a-brac.



30 Invisible weather seal, made with white cloth tape, blends perfectly with white woodwork around window. It keeps drafts out without affecting appearance of window.



31 Add contrasting edge to shelves in seconds without painting. Cloth tape sticks tight—has soft sheen.



32 Hinge and decorate a portfolio with it. Tape is strong, yet flexible enough to bend repeatedly without cracking or tearing.



22 Reflective insulation goes into a tight spot—aluminum-foil tape completes the seal effectively.



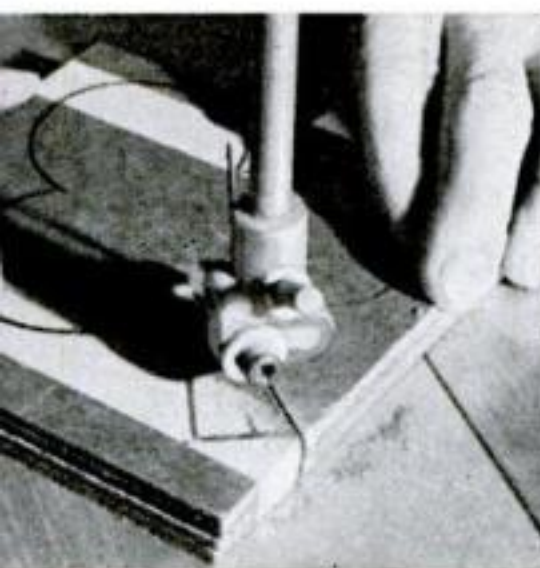
23 Joint in aluminum pipe is sealed and reinforced with aluminum-foil tape. Appearance of finished job is neat—all aluminum.

Carpenter's

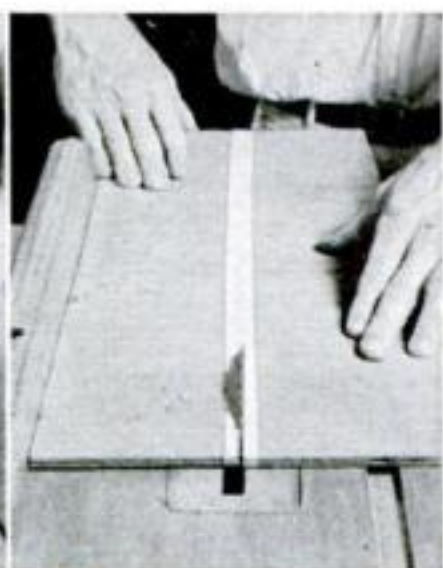
Here's a new one. It looks like narrow masking tape, but has practically no stretch. Printed on it, on 16" centers, are cross-hatched areas the thickness of a two-by-four. The big idea is to speed up home carpentry, especially framing.



24 Laid along sill, carpenter's tape indicates spacing of studs and rafters. You can use it for finishing an attic or recreation room.



27 Multiple jigsawing of wood, plywood, hardboard or plastics can be done without nailing if you bind the pieces together with masking tape. Cut the tape if you must.



28 Plywood won't splinter when sawing it if you first run masking tape over the area to be cut.

Cloth

Self-sticking cloth tape is made in just about every color and width you'd care to name. Use it to make things, mend things or to save painting. Cut initials out of it with razor blade and stick them on luggage or glass tumblers; they'll stay put.



29 Lamp shade is bound to wire frame and finished off at same time. Cloth tape in contrasting color does the job.



33 Add gay stripes to stool using strips of tape in alternating contrasting colors. You can't beat this easy method of refinishing a scuffed or marred surface.



34 Restore tattered bookbindings with tape of matching color. Titles can be added with colored ink.



35 Cover soiled tapes on Venetian blinds or make them blend with color scheme of room by sticking cloth tape over them.



36 A patch in time will prevent tear in auto-seat cover from getting larger. Choice of tape colors makes it easy to match patch to cover.

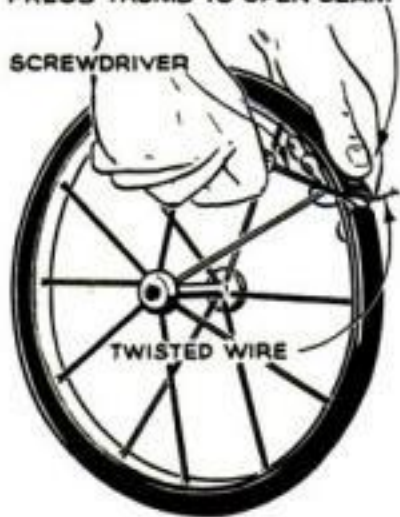
Tricycle Rolls on Hose



IF YOUR kid's tricycle is out of action with a missing tire, you can replace it with a makeshift but serviceable tread.

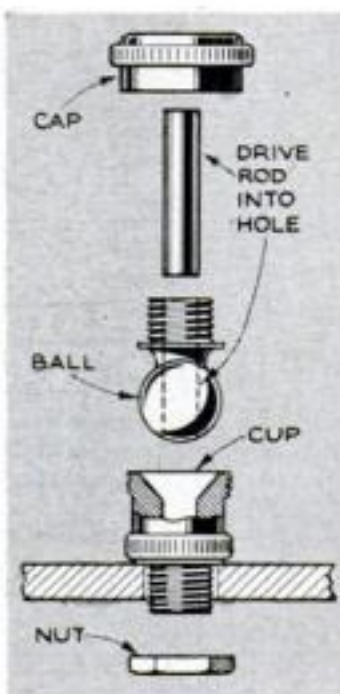
Cut a piece of garden hose to fit tightly around the wheel. Push a heavy wire through the hose, leaving a few inches exposed at each end. Now fit the tube around the wheel and twist the wires together until the ends of the hose are drawn tightly against each other. Snip off all but an inch of the twisted wire and force it into the joint where the hose ends meet. Grooved rubber hose makes the best tread.—*John Bombardt, Los Alamos, N. M.*

SQUEEZE HOSE NEAR SEAM AND PRESS THUMB TO OPEN SEAM

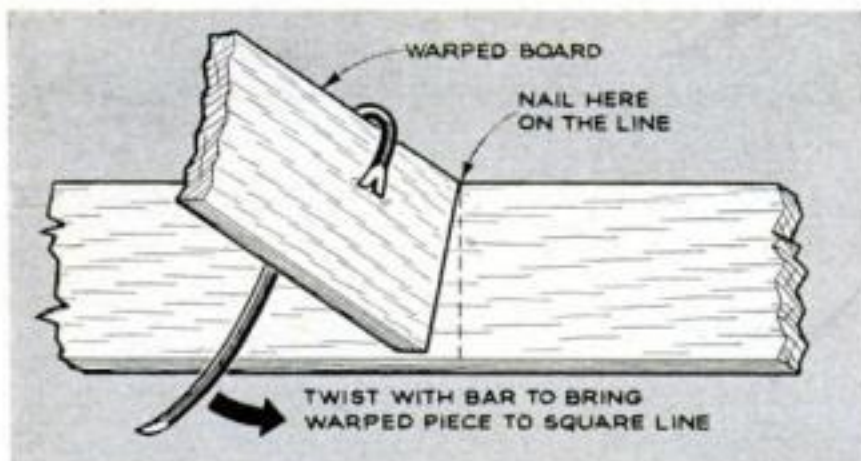


Light Clamps on Clip Board

A CHEAP laboratory clamp and a swivel connector of the kind used in wiring lamps will adapt a clip board for use in dark places. Drill a $\frac{3}{8}$ " hole in a corner of the board and mount the connector in it with a nut. Then drive a tight-fitting bit of rod into the cord hole in the ball member, slip on the retaining cap, and solder the clamp to the rod. Clamp a two-cell flashlight between the jaws.—*Floyd McGuckin, Ridge-wood, N. J.*



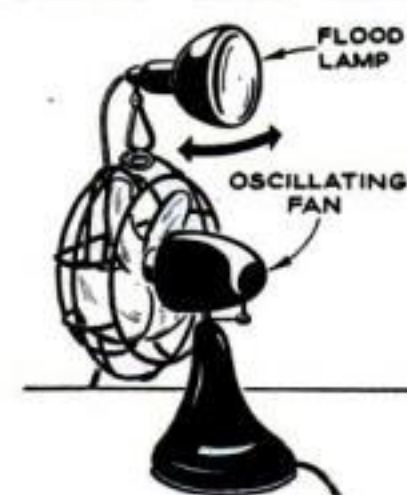
Working the Warp out of Wood



LUMBER that is badly warped can often be straightened with a wrecking or pinch bar. Nail one end in place as you would an unwarp board. Then with the claw of the bar hooked over the edge of the stock near its other end, lever it straight and hold it there while you nail it in place.—*Howard E. Moody, Upper Jay, N. Y.*

Fan Spreads Floodlight Evenly

IMPOSSIBLE to spread well-balanced lighting over a large picture area with a single floodlight? Not if you clamp the lamp to an oscillating electric fan. Point the lamp over the back of the fan to prevent a disturbing breeze. Then make a time exposure—a



couple of seconds will do—while the flood lamp sweeps the scene. Pleasingly soft shadows result from this simple trick which makes one lamp do the work of two.—*Hugh Lineback, Stillwater, Okla.*

Soldering Iron Works Off Your Automobile Battery



PLASTIC CHISEL HANDLE, a carbon from a flashlight cell, a piece of $\frac{3}{8}$ " brass tubing make up the outfit. Battery clips and some 8-gauge wire complete list of materials.



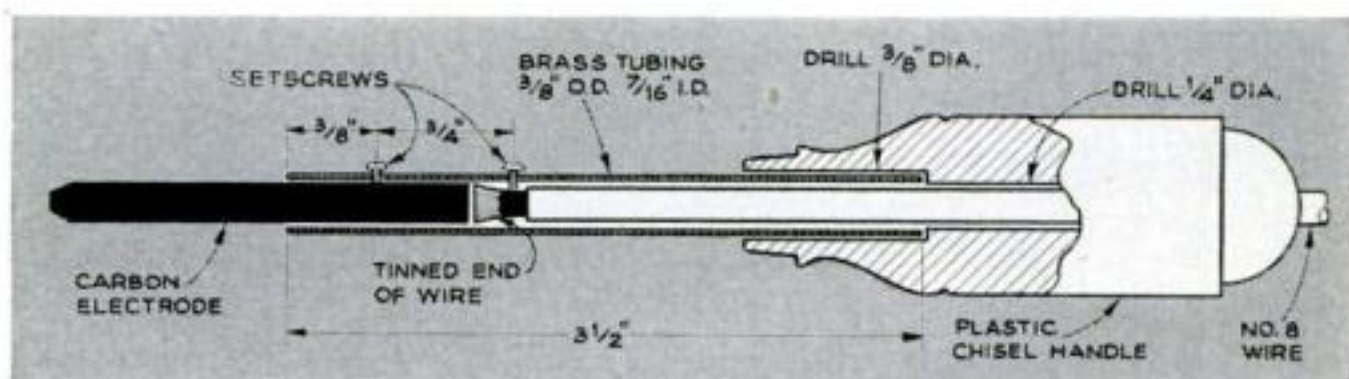
MANY a loose connection in a car has stayed loose because it was just too much trouble to drag out an extension cord, hook up the soldering iron and wait for it to heat. This outfit stays with the car because it's made to work off the car battery, and it heats instantly.

Drill a $\frac{3}{8}$ " hole part way through the plastic handle for the brass tube. Finish the hole with a $\frac{1}{4}$ " drill for the wire. Strip the insulation from the ends of a length of 8-gauge stranded wire. Tin one end, push it through the tubing and lock it with a setscrew. Clean the carbon electrode and file a bevel on the tip. Push it into the tubing snug up against the wire and secure it with a setscrew turned down slightly. At-

tach a battery clip to the other end of the wire. Make a ground cable from braided strapping or No. 8 wire. Attach clips to both ends.

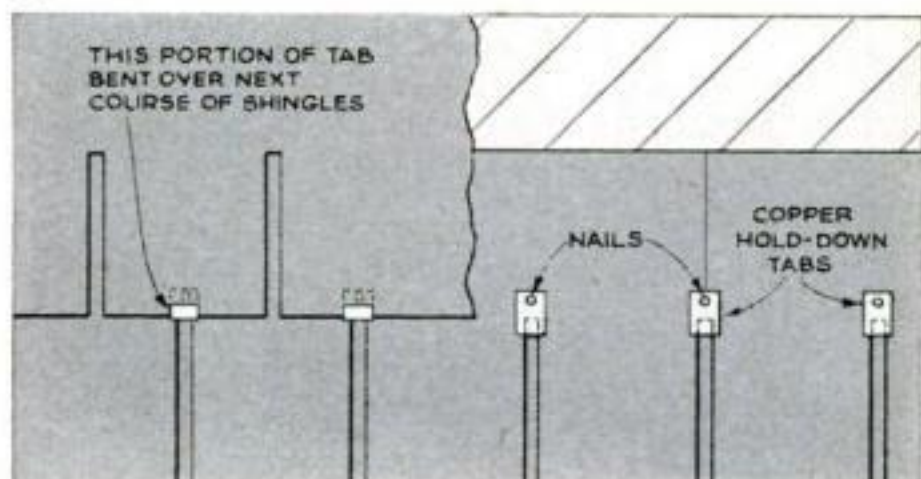
To use the outfit, clip the soldering-iron wire to the hot side of the battery and ground the part to be soldered to the frame or motor block. It is not necessary to disconnect the battery from the car. Touch the carbon to the work and draw it away slightly to create a small arc. Apply flux and solder to the work and hold the carbon in position until the solder begins to flow. Don't solder within six inches of the battery as the gas generated in the cells is highly explosive.—Pvt. P. E. McCafferty, Fort Bliss, Tex.

INSTANT HEAT is generated by touching carbon electrode against work grounded to frame or motor block of car. Iron draws no more current than cigarette lighter.



Tabs Hold Roof Shingles Down Against Pressure of Wind

UNRULY shingles that curl up or tear off in areas of prevailing high winds can be kept in place with small tabs of sheet copper. Cut each strip about 1" wide and 2" long and nail one end under the free edge of each shingle, then bend the other end back on top of the edge to hold the shingle firmly down. The sketch shows how to do it for shingle strips.—C. J. Horton, Buffalo.



Sam came down the alley in the ancient fire wagon, whipping the horses into a last furious charge.



An old smoke-eater with a two-horsepower fire wagon

Gus Answers a Fire Alarm

By Martin Bunn



makes things plenty hot for the Model Garageman.

THERE was an aroma about Sam Boise, and it had always been there as far back as anyone could remember. It was the smell of harness dressing and brass polish, a clean-scented reminder of the man's one love, his past and profession in a brawling, brightly colored time that is dead forever. The aroma belonged with the fierce mustache of 60 years' cultivation, with the remnants of brass-buttoned uniform, and with the pride and nostalgia in the faded blue of his

eyes. If it hadn't been for Sam Boise, the town might not have remembered the old firehouse and the horse-drawn steam pump-er that used to answer the bell sounding the alarm from the church tower.

Sam stood now in Gus Wilson's Model Garage staring with an expression of dis-taste at the modern fire truck that Gus was busily working on.

"Never had to give horses an overhaul! Keep 'em in hay and rub 'em down with

burlap, and they'd always answer the bell."

"You're right, Sam. But trucks are faster."

"Faster!" Sam snorted. "We had two dappled grays, Harry and Old Dad, that could get to a fire as fast as any of these gas-belchers! I'd even say those two whites I got now would show a good race."

Gus grinned. Good old Sam. The old firehouse still stood, just a few blocks away. The fire wagon was still there, gleaming brass and wood, and bright red paint. Sam managed, too, to keep a pair of horses.

The old volunteer brigade had long since faded into the land of yellowed photographs, but Sam had stayed on. Not that he ever answered the alarm any more. But he turned the old firehouse into a sort of museum, something for people to look at and remember. And the mayor saw that a dribble of civic funds kept Sam from running the place on pride alone.

"So you don't care for the gasoline age?"

"You know the old saying, Gus."

"Sure: 'Get a horse!'"

"It still goes. If the department still used horses, you wouldn't be breaking your back over that machine."

"Hey, old-timer, I've got to make a living! And besides, I don't get a fire truck in here very often. They've got their own mechanic over at the firehouse. Just don't have the equipment to do a major overhaul, that's all."

Gus was fitting new rings to the pistons when the sound of a fire-engine siren wailed over the noon quietness of town.

"There goes one now," Gus said.

"It's a bad day for a fire. Dry wind. No rain in a long time."

"Yeah, looks that way. But they got that other truck to use while this one's out of commission."

An Old Fire Horse Never Forgets

Sam Boise fidgeted in the doorway for a moment. It was hard for an old fire horse like him to sit back and do nothing. He was near 80, but there are some things a man never forgets.

"I can smell it," Sam said.

Gus sniffed but got only the odor of the

grease in the garage. He continued his work, thinking about lunch.

A moment later, the phone rang.

The voice at the other end was Fire Chief Joe Insley's. Gus listened for a minute, and then hung up with a bang.

"I've got to run, Sam. That engine just quit at the fire, and she's not pumping water!"

"What's burning?"

"The warehouse in back of Johnson's Hardware."

Gus jumped into his truck and barreled out of the garage.

The fire was only a short distance away, in an alley just off the main street. He knew the warehouse. It was loaded with piles of linoleum, furniture, plastics, fabrics. And almost jammed against the warehouse on three sides were wooden frame buildings.

When he was only a block away, Gus slowed up at the police line thrown around the area to keep people from under foot. A huge cloud of smoke was billowing up, dimming the sun.

"Let him through," he heard a voice shout, and saw Officer Billy Ryan waving him on.

He stopped at the entrance of the alley. A long ribbon of hose stretched from a hydrant on the main street, through a building to the great water tanks in the truck, but it was of no use without the powerful pump to boost the pressure lost over the distance. Joe Insley came up to him with desperation in his face.

"Glad you're here, Gus. The engine just acted up all at once. She'll idle all right, but we have to lock the throttle at a higher speed for the pump to work fast enough. As soon as we try to go over an idle, she quits. There isn't much time. The fire isn't burning too fast now, but if it spreads to those stores of fabrics and plastics . . ."

Gus lifted the hood and took in the engine layout with a quick look.

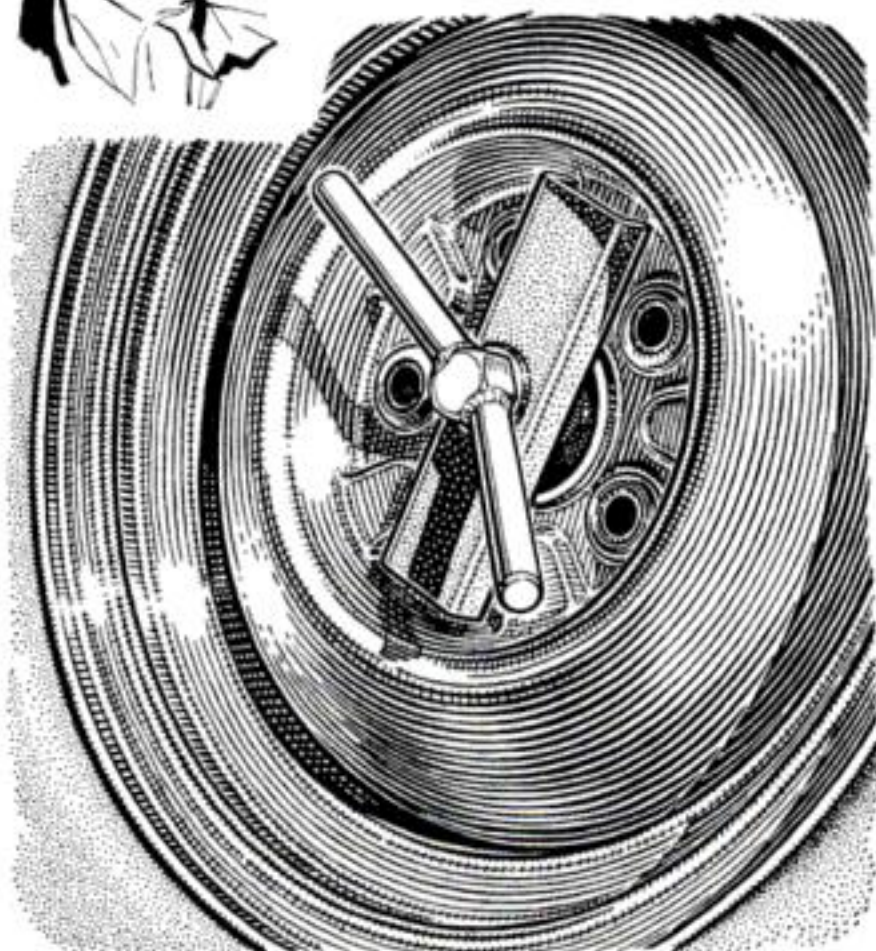
It wasn't easy, trying to diagnose engine trouble with smoke stinging his eyes, standing in a shower of ashes and sparks. One minute's delay might mean one spark too

[Continued on page 250]





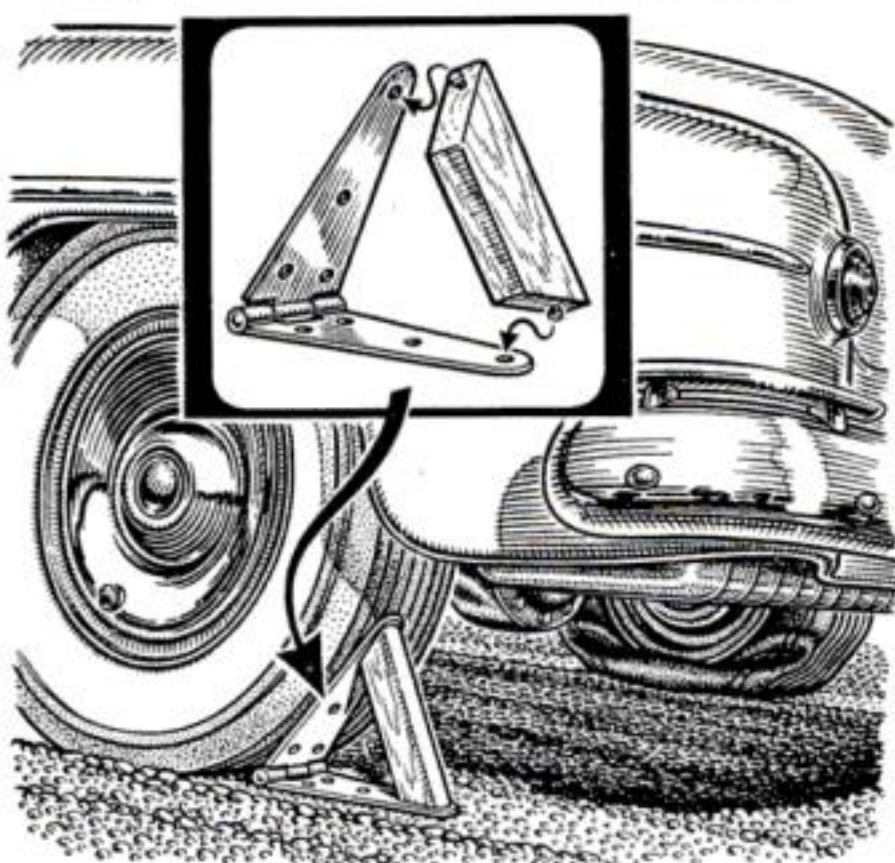
Hints FROM THE MODEL GARAGE



A spare-wheel nut becomes a quick-acting wrench for removing and mounting the spare in the luggage compartment when two $3\frac{1}{2}$ " lengths of $\frac{1}{2}$ " rod are welded to it to form a handle. The handles also reduce the chances of the nut rolling out of sight.



A kitchen towel holder mounted under the deck lid with self-tapping screws will speed clean-up operation after you make roadside repairs or change tires. Keep waterless hand cleaner in the trunk to loosen the grime before wiping.



A collapsible wheel chock may save your car from an unexpected take-off when changing a tire. A nail protruding from each end of the wooden brace fits into the end screw holes of the strap hinge to hold it open. The chock folds flat for storage.

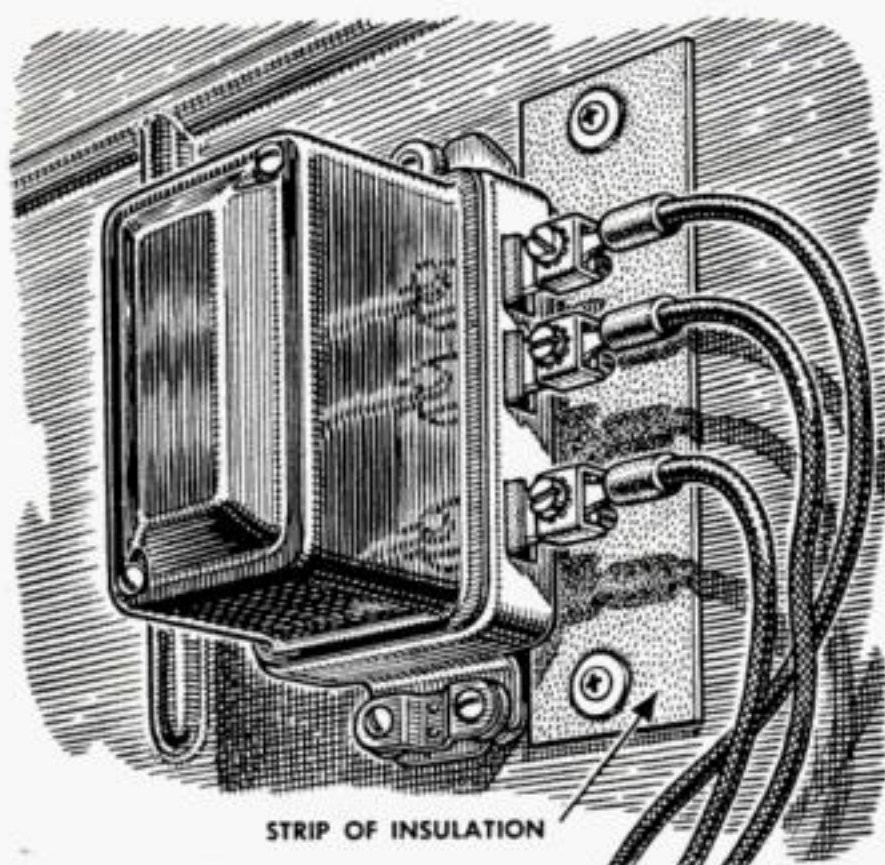


Clutter on a garage shelf can be hidden behind a canvas curtain. Tack the curtain to a wood strip over the shelf, letting it hang freely for easy lifting when something is needed. Protected from the weather, the canvas will last for years.

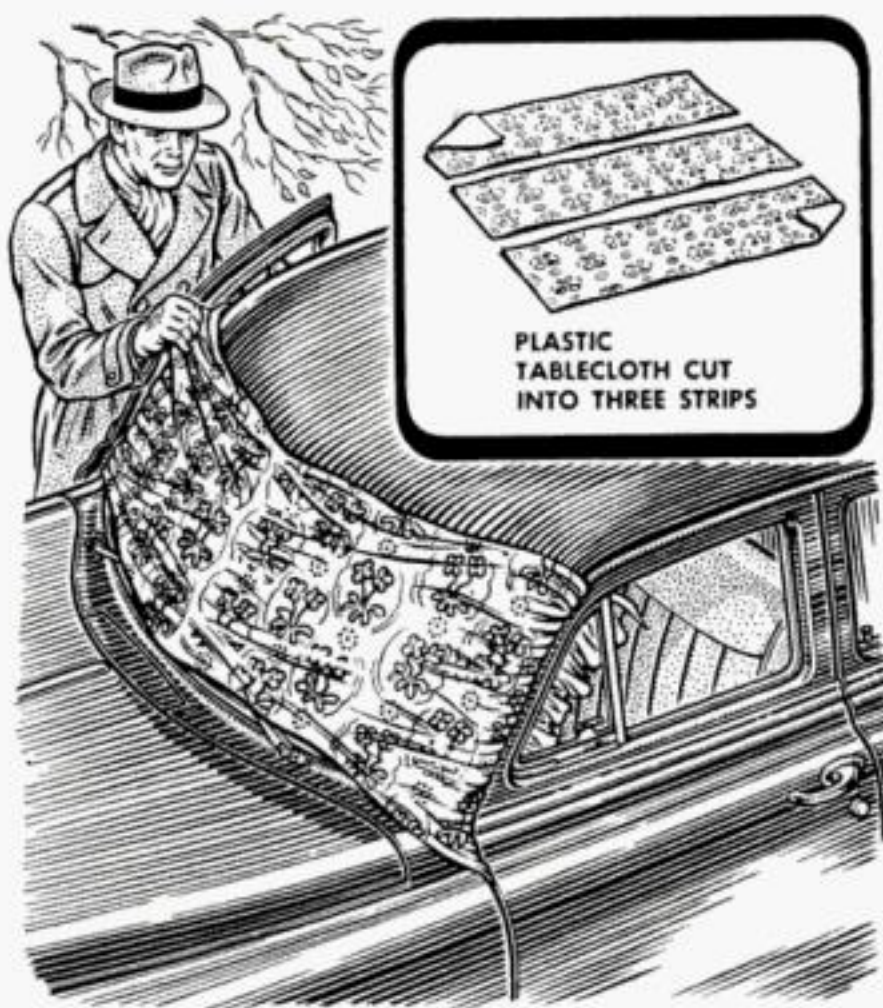
Please turn the page for more auto hints.

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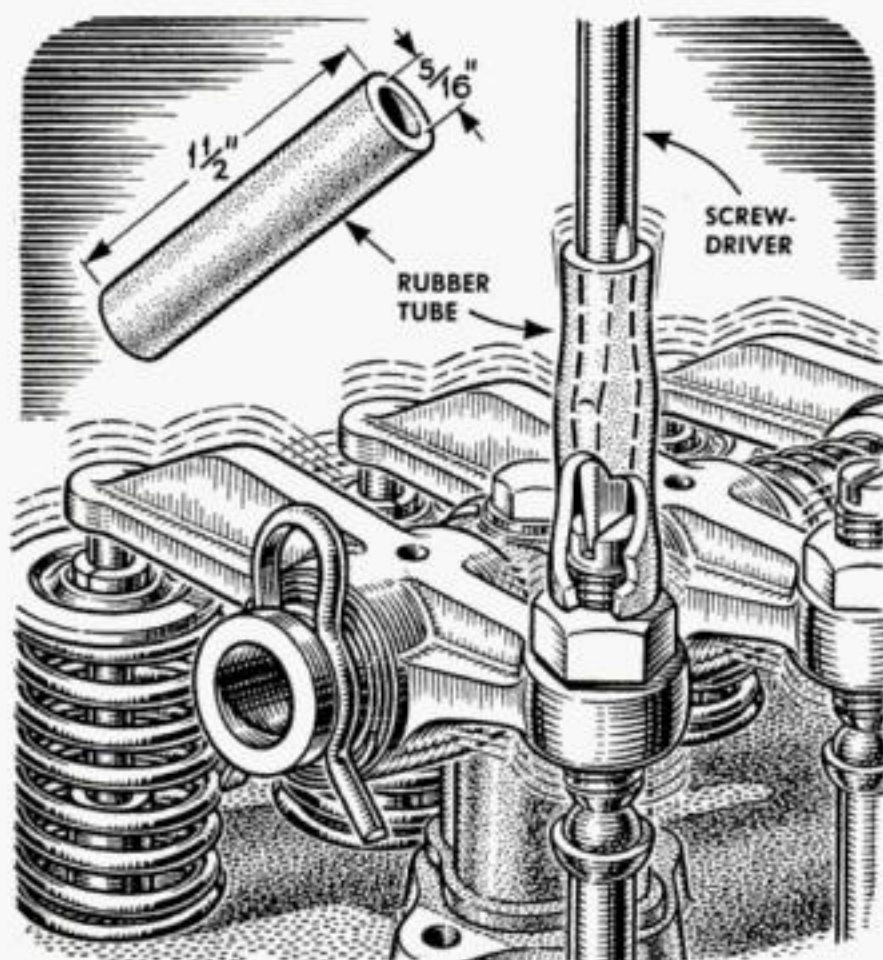
MORE Hints from the Model Garage



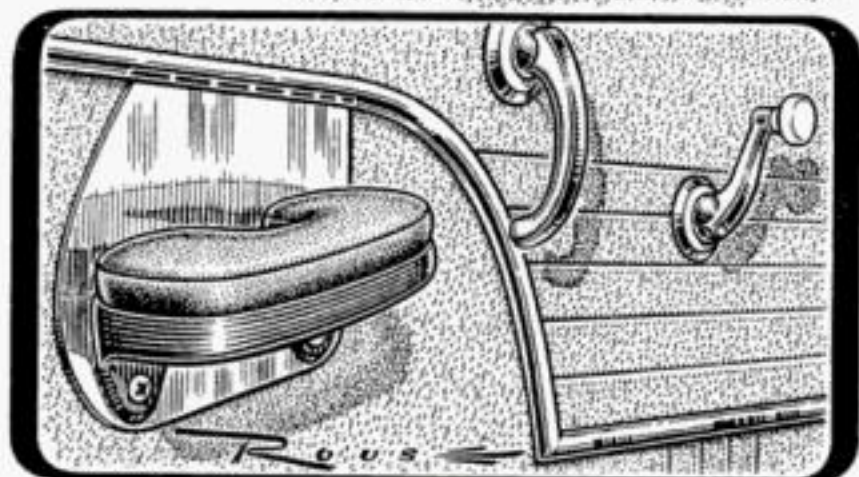
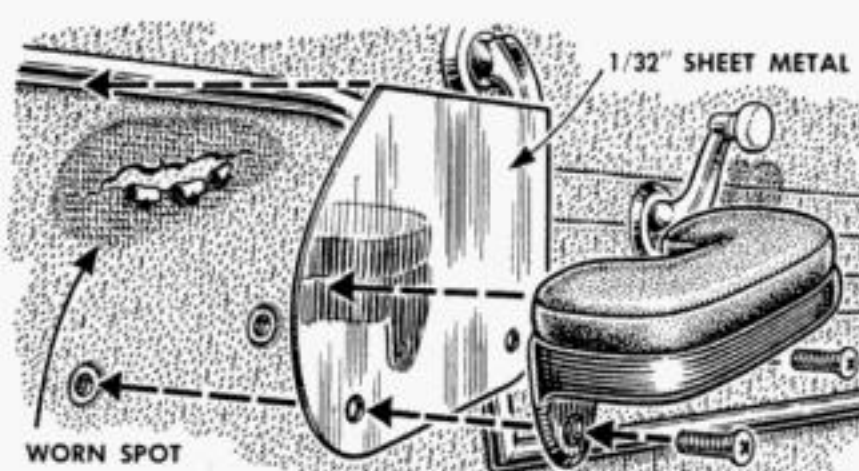
A possible cause of shorts is small clearance between the voltage-regulator terminals and the metal fire wall of a car. A strip of gasket material fastened to the fire wall behind the terminals will prevent shorts from bent terminals or oversize bolts. A tire patch cemented to the fire wall could also be used.



Sleet on your windshield can be hard to remove—especially if the car has been parked for several hours. When icy weather threatens, lay a strip cut from a plastic tablecloth across the windshield and tuck it in the doors. When you return, you can remove the strip and shake the sleet off it in a few seconds.

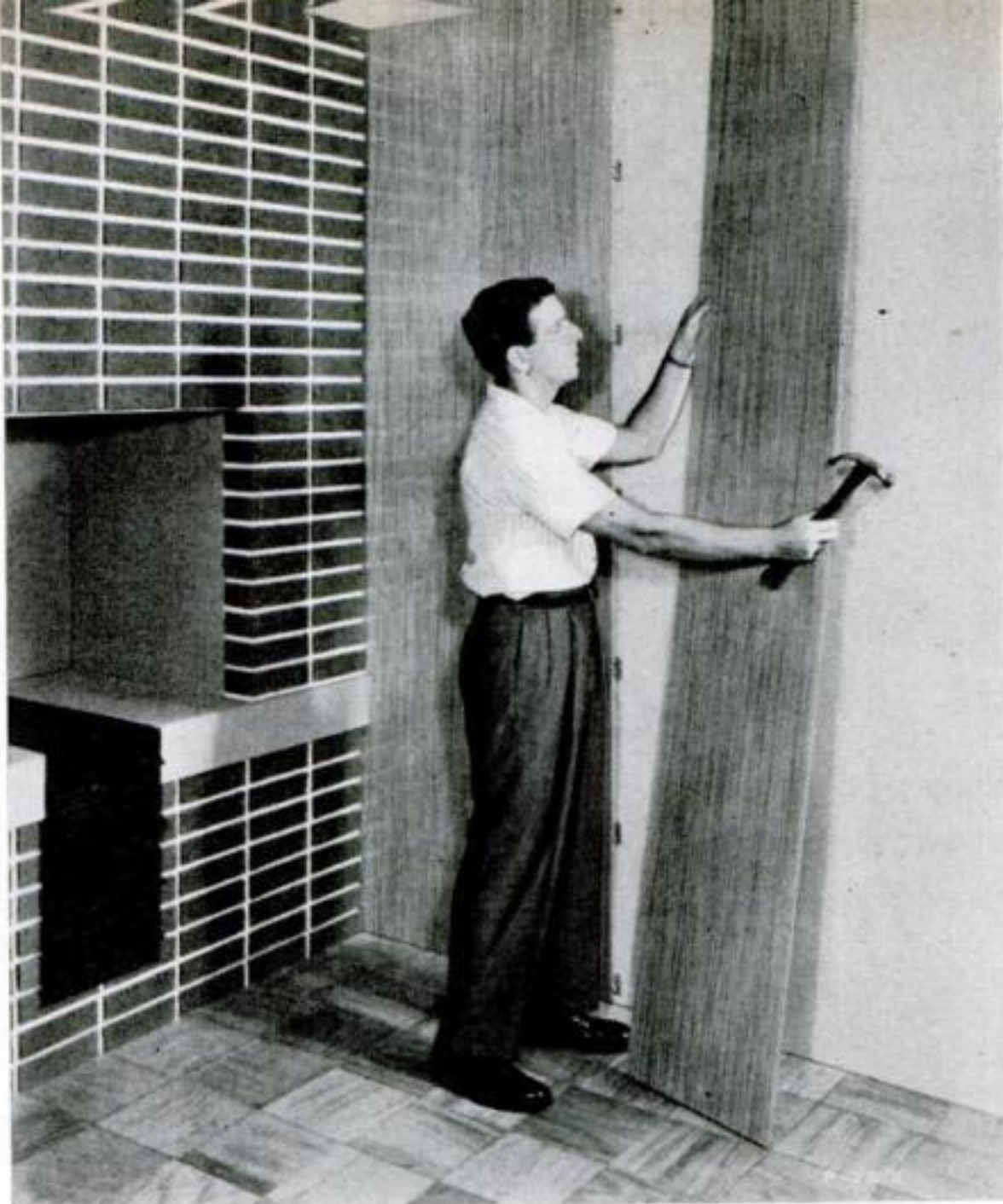


A length of rubber tubing slipped over your screwdriver will hold the tool in the slot while you adjust bouncing valve tappets. The hose fits over the adjusting screw and leaves the lock nut exposed for tightening when the right setting is made.



A stainless-steel plate fitted between the armrest and the door upholstery will save the fabric from wearing or cover an already worn spot. Slip the upper edge of the plate under the decorative molding strip and hold it in place with the armrest screws.

New for the Handy Man



1. Plastic Planks Look Like Wood. Just nail up these plastic-faced planks and you have a permanent, washable wood-grain wall that needs no further finishing. The 16"-by-8' planks are 3/16" hardboard coated with a smooth, tough baked-on finish that resists heat, moisture, dirt and stains. Tongue-and-groove edges hide nailheads and joints. The panels are available in four simulated wood grains, as well as 10 solid colors, and also come in 16" squares.



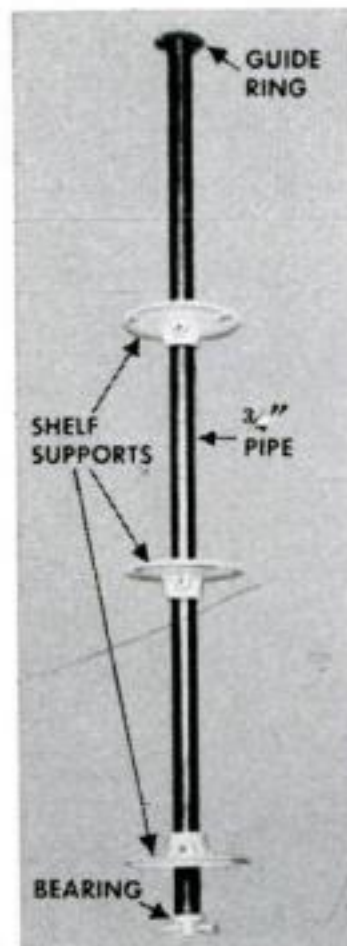
2. Clamp Seals Pipe Leaks. Leaks in water, steam, oil and other pipes can be quickly fixed with this clamp-on mender. The clamp is tightened around the pipe

at the point of the leak and has a neoprene gasket inside that makes a waterproof seal. Two types fit elbows or straight sections and come in various pipe sizes.

3. Flashlight Has Probe Arm. Pinpoint light for probing in small, dark corners is instantly available on this flashlight. Snapping out the hinged arm automatically switches light from the main bulb to a tiny one on the flexible probe tip.



Further information on these products can be obtained from: 1. Marsh Wall Products, Inc., Dover, Ohio; 2. Holool Mfg. Corp., P.O. Box 95, Bellerose 26, N. Y.; 3. U. S. Electric Mfg. Corp., 222 W. 14th St., NYC; 4. Lake Drive Products Co., P.O. Box 22, Edgerton, Wis.



4. Kit Builds Corner Shelves. You can add a set of revolving shelves to a kitchen corner cabinet with this kit of hardware. The top and bottom guides and three shelf supports are made to fit on a length of standard 3/4" pipe, which can be bought locally cut to the right size. Shelves are made from 3/4" plywood and simply screwed to the support rings.



What You Can Do with Glass-Fiber Mats

Here are a dozen new ways to put this familiar insulation to work, now that you can buy it in any length you need.

YOU can now buy glass-fiber insulating material by the foot or yard, and there are scores of ways to make use of it that you may not have thought of before. The drawings on these pages show a dozen or

so of its most practical applications.

The stuff consists of thousands of fine glass fibers held with binders to form a soft, light, flexible blanket as thin as $\frac{1}{2}$ " and from 18" to 72" wide. So fine are the fibers and so closely bound that they cannot come loose or lodge in the skin.

You can cut the material with scissors, and then cement, staple or tack it in place and shape it to fit almost any contour.

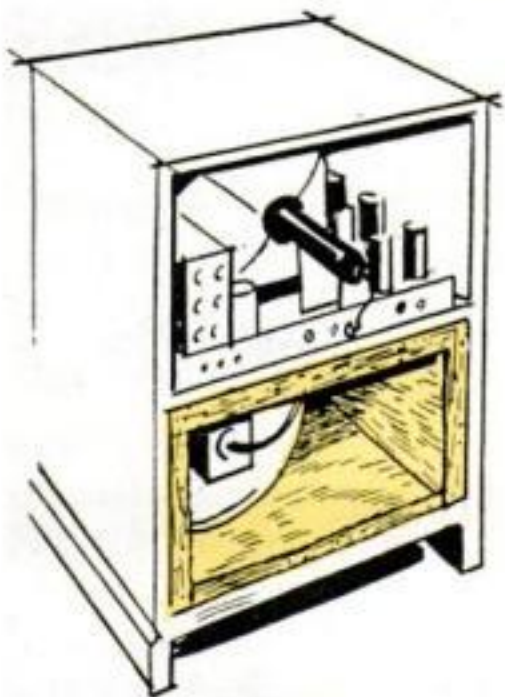
Called Super-Fine Fiber-Glass, it chiefly insulates against heat, cold or sound. But it is also fire-resistant and verminproof.

It has many possible home uses besides those shown here. For instance, it can serve as blackboard erasers, sun-hat liners, cold shields for mattresses, pot holders, weather stripping, coat or boot lining, bedding for family pets and frost blankets for shrubs.

The handy material can also be used as a washable stuffing for dolls and to pad fragile items for mailing.



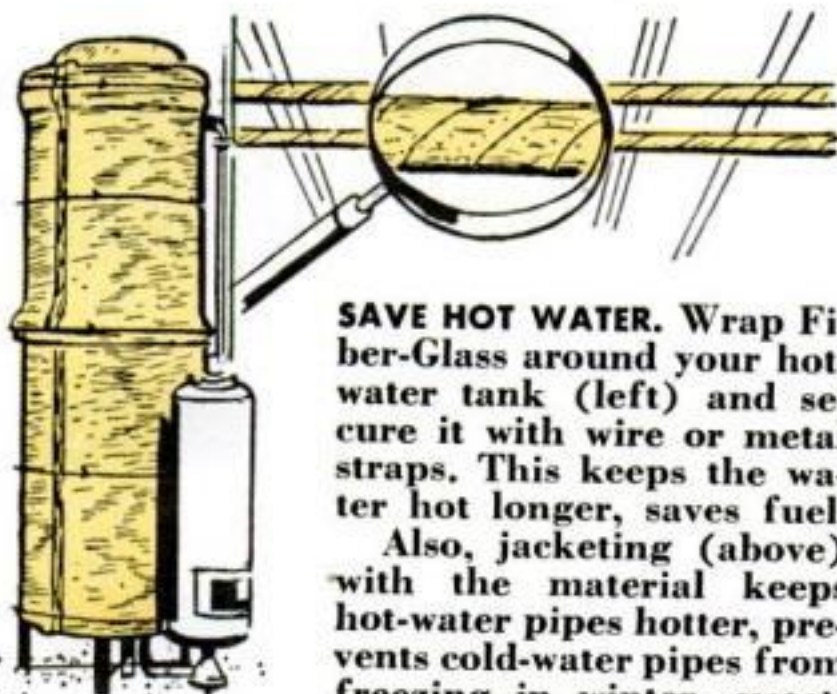
DEADEN CAR NOISE. Cemented to the underside of your automobile hood, glass-fiber insulation will help quiet the engine.



IMPROVE TV SOUND. Line the speaker compartment of your TV cabinet to reduce high-frequency rattle and provide better tone.



KEEP FLOORS WARMER. Staple insulating blankets under the joists in your cellar. This cuts off drafts and enables you to maintain more even temperature upstairs at less fuel cost.

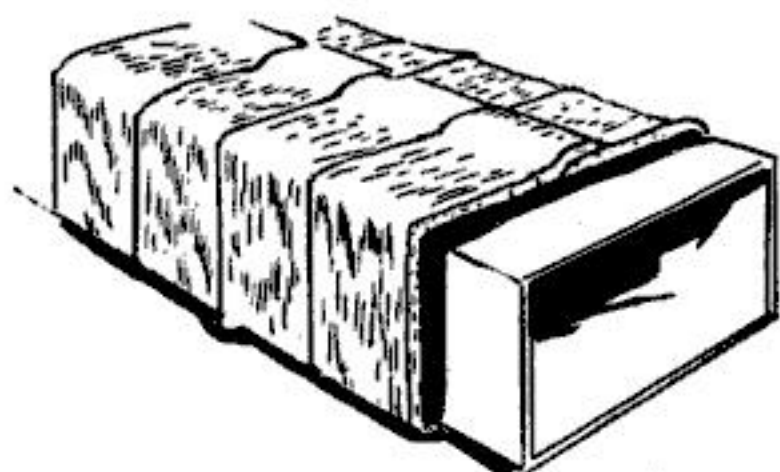


SAVE HOT WATER. Wrap Fiber-Glass around your hot-water tank (left) and secure it with wire or metal straps. This keeps the water hot longer, saves fuel.

Also, jacketing (above) with the material keeps hot-water pipes hotter, prevents cold-water pipes from freezing in winter, sweating in summer.



QUIET YOUR SHOP. Reduce power-tool noise within the room and insulate the rest of the house from it by applying glass-fiber blankets to the studding or over the furring strips.

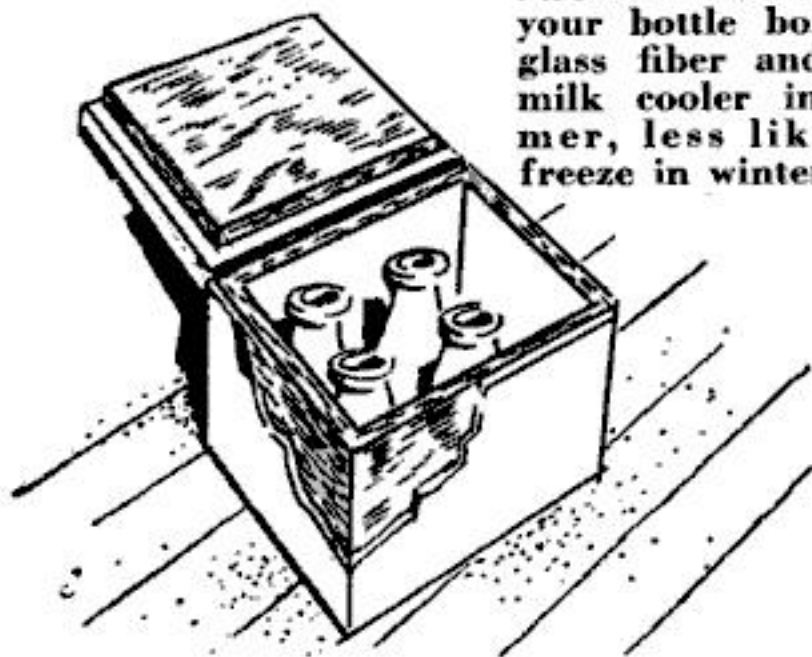


IMPROVE AIR DUCTS. Make both hot- and cold-air ducts more efficient by wrapping them in Fiber-Glass, leaving a 3" overlap. Then cement, bind or staple the blanket in place.

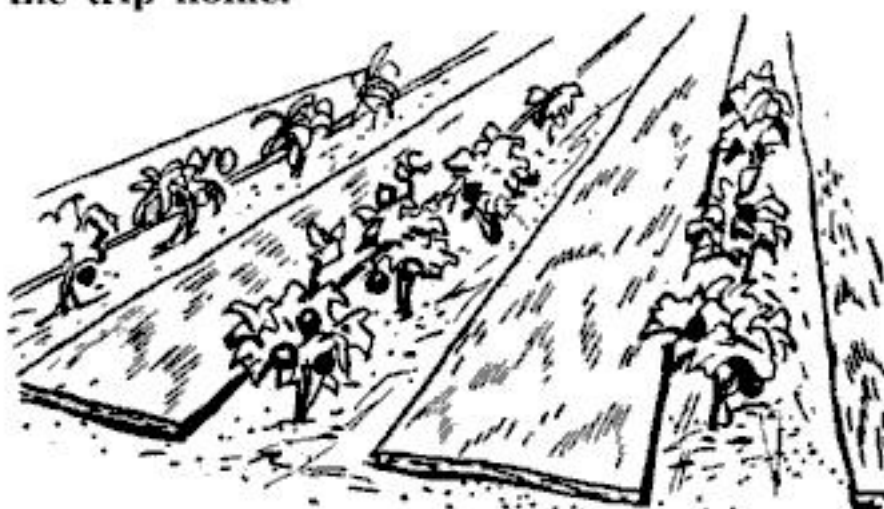
KEEP FOODS FROZEN. When you're defrosting the refrigerator or freezer, pack frozen foods in a carton lined with the blanketing.



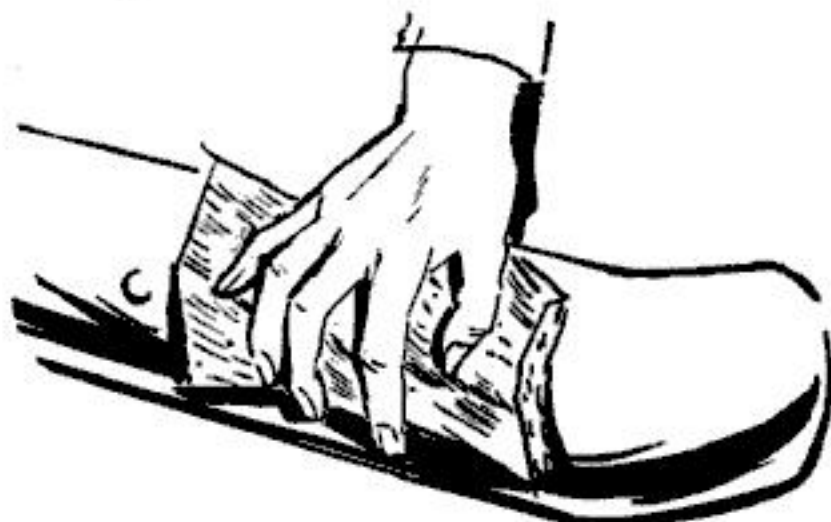
PROTECT MILK. Line your bottle box with glass fiber and keep milk cooler in summer, less likely to freeze in winter.



LINE PICNIC BAGS with the stuff. You can preserve ice cream and keep soda cold this way, or keep the baby's milk bottles at the proper temperature. If you've had a good catch of fish, ice it and wrap in a glass-fiber blanket for the trip home.



REDUCE CULTIVATING. Use strips of the insulating material as a mulch. It keeps moisture in the ground and holds back the weeds.



SHINE UP CHROME. Cut into handy pad size and clean your car's chrome or the kitchen porcelain with Fiber-Glass. It doesn't scratch.

KEEP GLUE HOT—or roofing compound, for that matter—by wrapping the container in a strip of the insulating material.





Rubber Collar Steadies Ladder

A RUBBER collar made of a short section of old tire casing will hold your ladder safely in place when you have to rest it against a flagpole, lamppost or other narrow upright. Nail the collar to a flat crosspiece fastened near the top of the ladder.—*Bob Poulson, Los Angeles.*

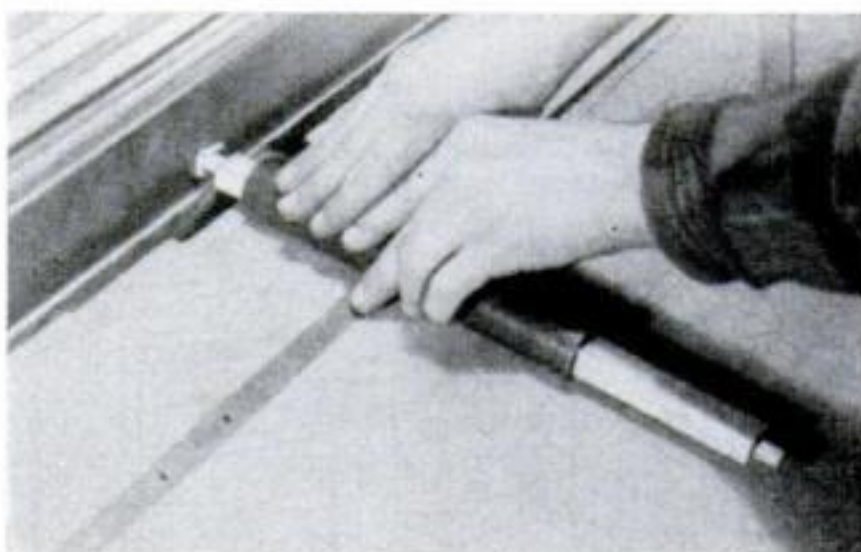
Crown of Electrical Tape Steadies Wandering Sander Belts

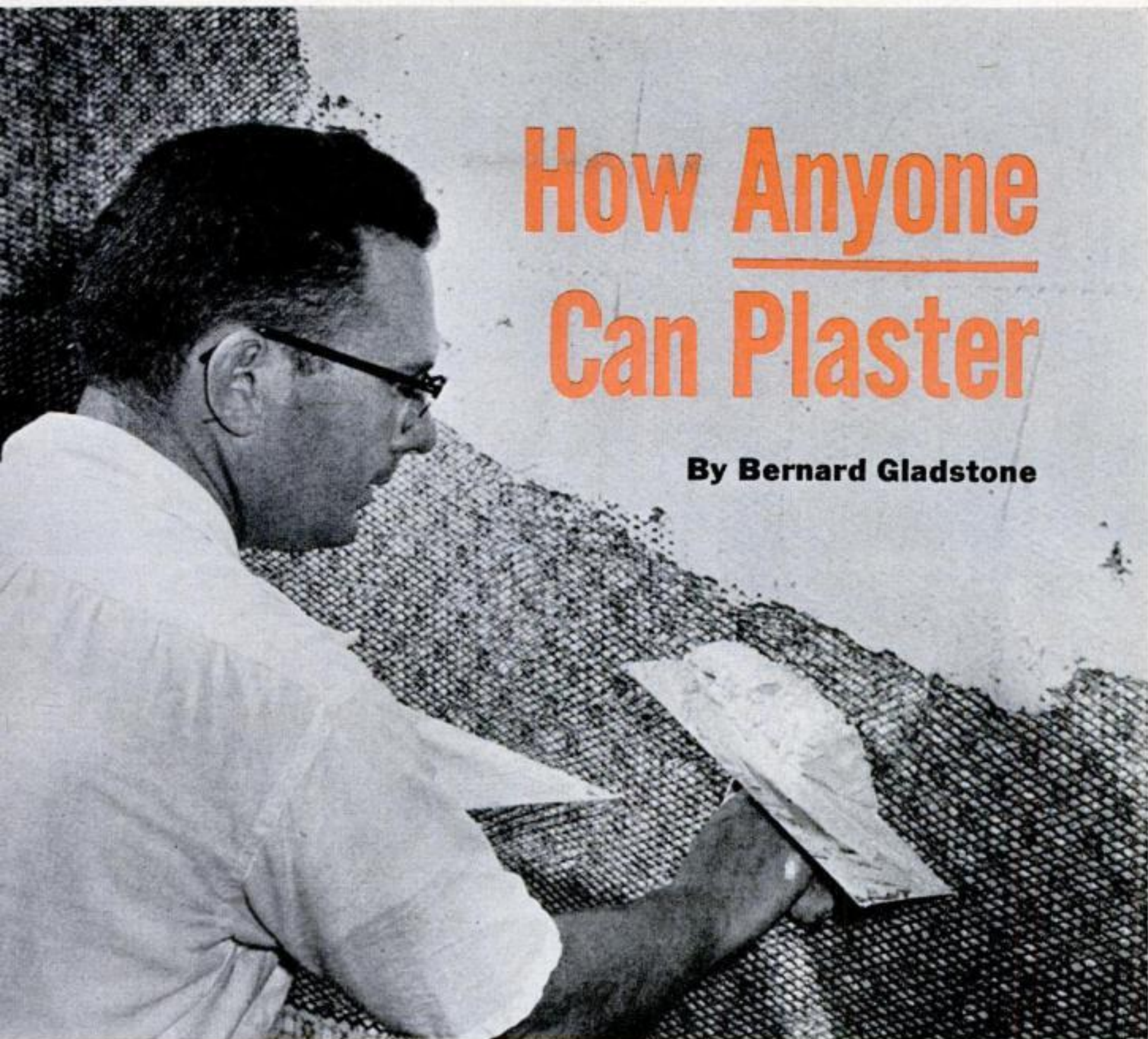
SOME sanders come with crowned idler pulleys, giving lateral stability to the belt, which has a natural tendency to center itself on the crown. If your sander pulley isn't crowned, or the crown isn't high enough for proper belt tracking, try cementing a ring of electrical rubber tape around the center of each drum. To remove accumulated dust before applying the tape, clean the drums with carbon tet or gasoline and let them dry thoroughly. Then brush a layer of rubber cement around the center of each drum and allow it to set until tacky. Wrap the tape firmly over the cemented area, rubbing out any air bubbles that may have formed underneath. Make a slanting butt joint. The resulting surface is durable enough for ordinary use.—*Harry L. Truchelut, Atlanta.*



Tenons Cut with Dado Blade

TENONS are easily cut on any size of round stock with a dado wheel mounted in a bench saw. Above, Harold Jackson of Kankakee, Ill., holds the spindle against the miter gauge and slowly turns it against the blade. A board clamped to the rip fence protects the blade on short tenons. Below, Andor Andrews, Seattle, shows how to cut round tenons on square stock. The stock is slipped through a short tube, centered with wedges, and the tube rotated slowly against the miter gauge to give the effect of turning a round piece of stock.





How Anyone Can Plaster

By Bernard Gladstone

New plaster over old is latest trick for repairing damaged wall without tearing it down. Lath is nailed over old wall, then covered with

new lightweight plaster that adds modern, textured finish without extra work and weight of old-type plaster job.

This modern, two-coat short cut lets you put a new wall over an old one—without even removing the wallpaper.

HAVE you always shied away from plastering a wall? Do you think of it as a job only for a man with long experience? Then listen to this:

Any able amateur can put up *modern* plaster walls—the type you find in hundreds of new homes. What's more, these walls can be slapped up right over an old surface, skipping the gritty, bomb-disaster stage of tearing down old plaster.

It's true that a slick, three-coat plaster job is just as difficult to achieve as ever, and if you must have that, better hire a

pro. But what you can do yourself is simply skip the mean part—the final white coat that must be troweled glass-smooth. By letting two coats do the work of three, you end up with an intentionally textured surface that doesn't have to blush because it has some bumps in it—it's supposed to have them.

If you prefer plasterboard, you can also achieve a finish that looks like textured plaster. You do it with new plasterlike paints.

Wall on a wall. One of the developments that make it easier to put new plas-

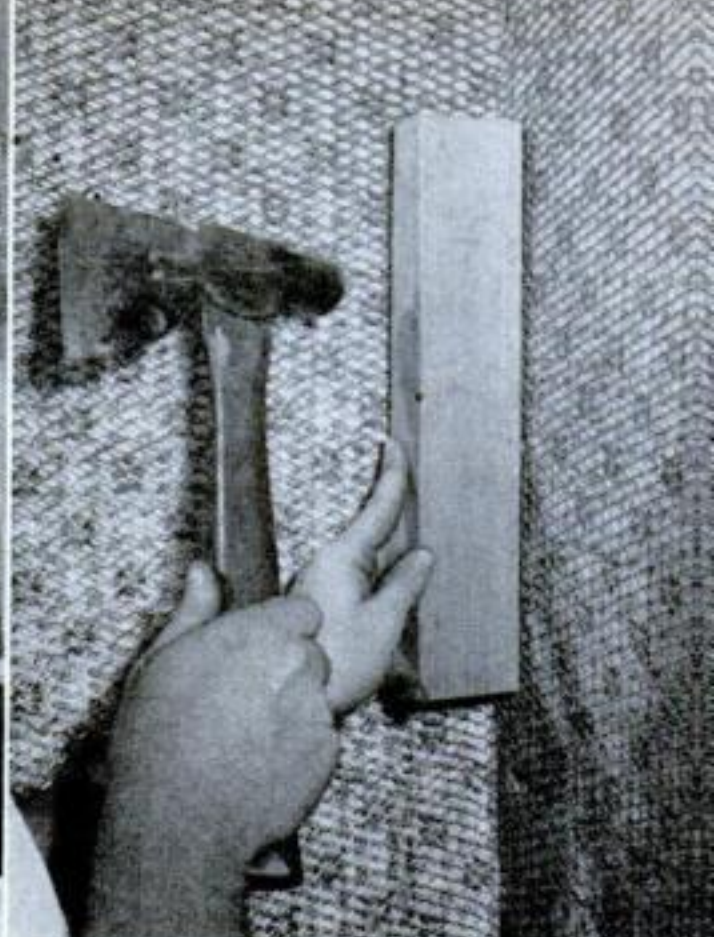
NEW LATH NAILS TO OLD WALLS



1 Casing beads, made of metal channel with narrow strips of lath attached, are first nailed around windows and doors to frame openings and form "grounds" to guide depth of plaster. Use hacksaw and miter corners to a close fit.



2 Lath is nailed to studs through old wall. Run strips across windows and other openings, then trim out waste. Use 2" roofing nails about 8" apart. Overlap strips 2" at edges and stagger end joints so they fall on different studs.



3 At corners, bend lath around two-by-four and tap into place to make neat, sharp angle. Make sure end turning corner is long enough to reach next nearest stud. For outside corners, special metal bead is nailed over edge first.

TWO PLASTER COATS SAVE WORK OF THREE



1 First plaster coat is troweled on just thick enough to embed lath completely. Work plaster in and around lath to insure firm bond. Mix plaster to a stiff, buttery consistency and work quickly, as it sets in about an hour.



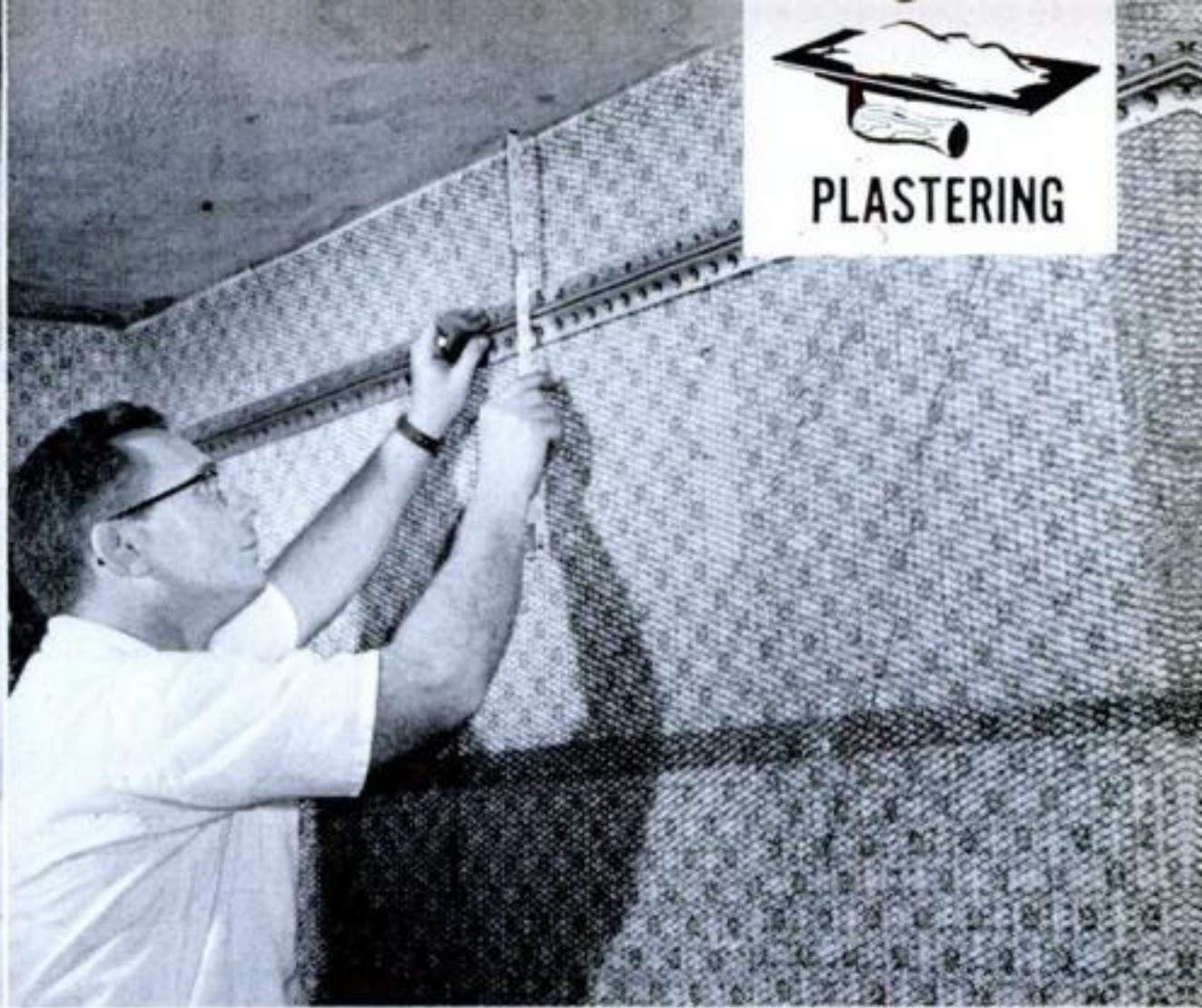
2 Scratch marks are made as first coat begins to set but is still workable. Use scrap piece of lath and make crisscross furrows in plaster to roughen it and provide good gripping surface for second, or "brown," plaster coat.

ter on an old wall is a dimpled metal lath that has a series of small depressions pressed into it. These hold the lath about $\frac{1}{4}$ " away from the wall so that plaster can get in behind, and save the need for bothering with furring strips.

Another development that helps is that of new lightweight plasters which can be put over an existing wall without overloading the structural members. These come pre-mixed like cake batter and need only water to make them ready to use. Containing ex-



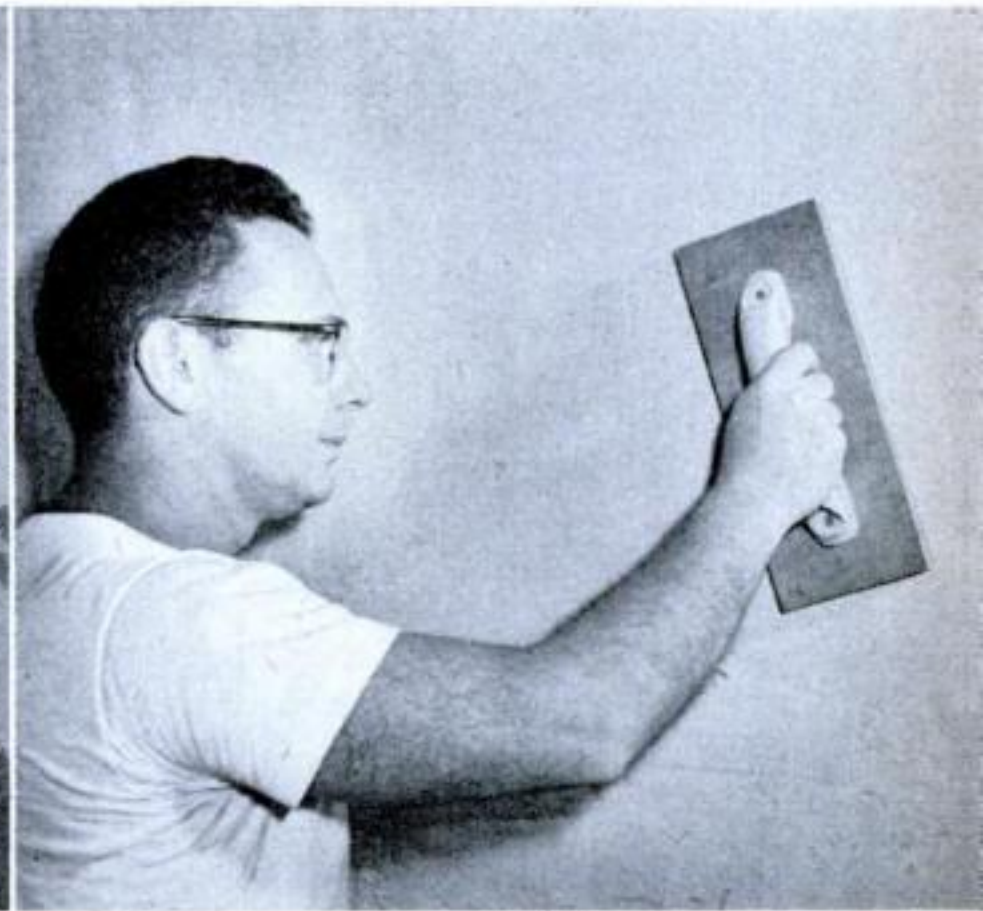
4 Openings for outlets are cut after lath is put up. Fixtures must be set out $\frac{3}{4}$ " to bring them flush with the plaster. This can be done with extension rings, made to fit most outlet boxes, or by blocking box out with wood from behind.



5 New picture molding is slotted metal strip that's nailed to wall 8" to 10" below ceiling after lath is in place. Strip provides almost invisible groove for hanging pictures without nailing into plaster and also serves as upper grounds, or guide line, for gauging thickness of plaster. At the same time, a $\frac{3}{4}$ "-thick wood strip several inches wide is nailed along base of wall to form lower grounds. Strip also provides nailing surface for fastening on base-board later.



3 Second coat is put on slightly thicker than needed, then scraped down flush with grounds with 1"-by-6" board that rides on picture molding at top and wood strip at bottom. Low spots are filled, rough areas smoothed.



4 Wood float gives final finish to second coat. Let plaster dry firm but not hard, then rub float over face with flat, circular motion. Result is smooth, sandy texture that makes attractive finish without further work.

tremely light aggregates such as perlite or vermiculite, they weigh only about half as much as regular sanded plaster and are more fire-resistant, too. They're sold under a variety of trade names, but you can be sure of getting the right type if you ask for

them by the names of the aggregates they're mixed with.

How you do it. The lath comes in strips about 26" wide and 8' long. The only trick in putting it up is to make sure that it is nailed firmly to the studs through the old

BIG PLASTERBOARD SHEETS GO UP FAST, ARE EASY

wall. You can find the studs, usually 16" between centers, by tapping the wall or drilling test holes that will be covered with plaster later. Mark the studs with a heavy colored crayon that will show through the lath. All lath strips must start and end on studs to insure a firm bond with the wall.

With the lath up, the first or "scratch" coat is troweled on just deep enough to cover the lath. The second or "brown" coat should then be put on before the first has completely dried, usually the following day. If you have to wait longer, wet down the first coat before applying the second. The final smoothing of the second coat produces a sand finish that can be left as is or further textured with one of the special paints.

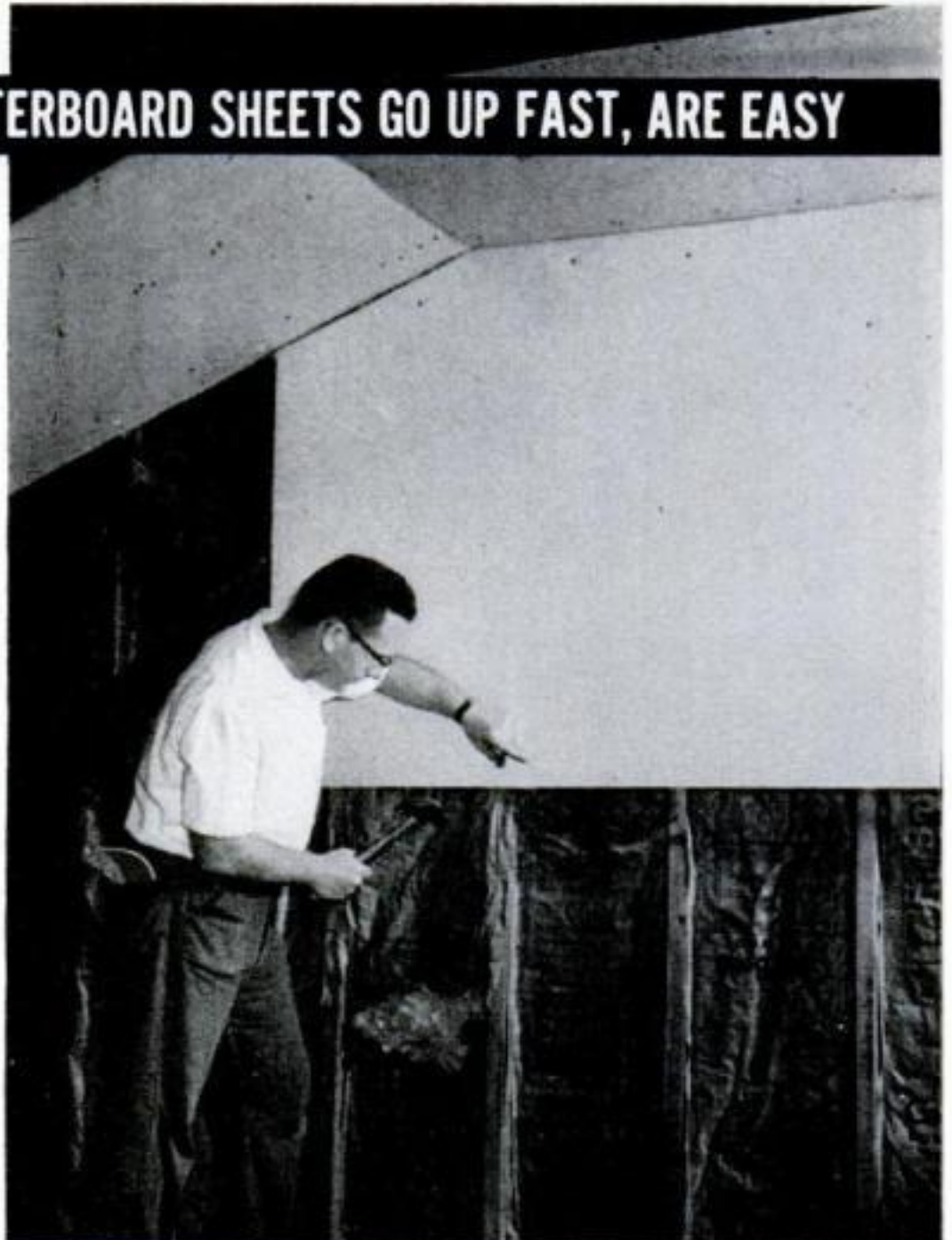
Putting up plasterboard. On new walls, you'll probably find it easier to put up your plaster in the form of big plasterboard sheets. These are 4' wide and come in lengths up to 12'. The 4'-by-8' size, however, is about the limit for easy handling by one person and just fits nicely across three stud spaces when put up vertically or six stud spaces horizontally.

The more common thickness is $\frac{3}{8}$ ", but the $\frac{1}{2}$ " will give you a more solid wall at only slight extra cost. Be sure also to get the recessed-edge type. These panels form a shallow depression along each joint into which you cement a special patching tape to provide a smooth, flush seam.

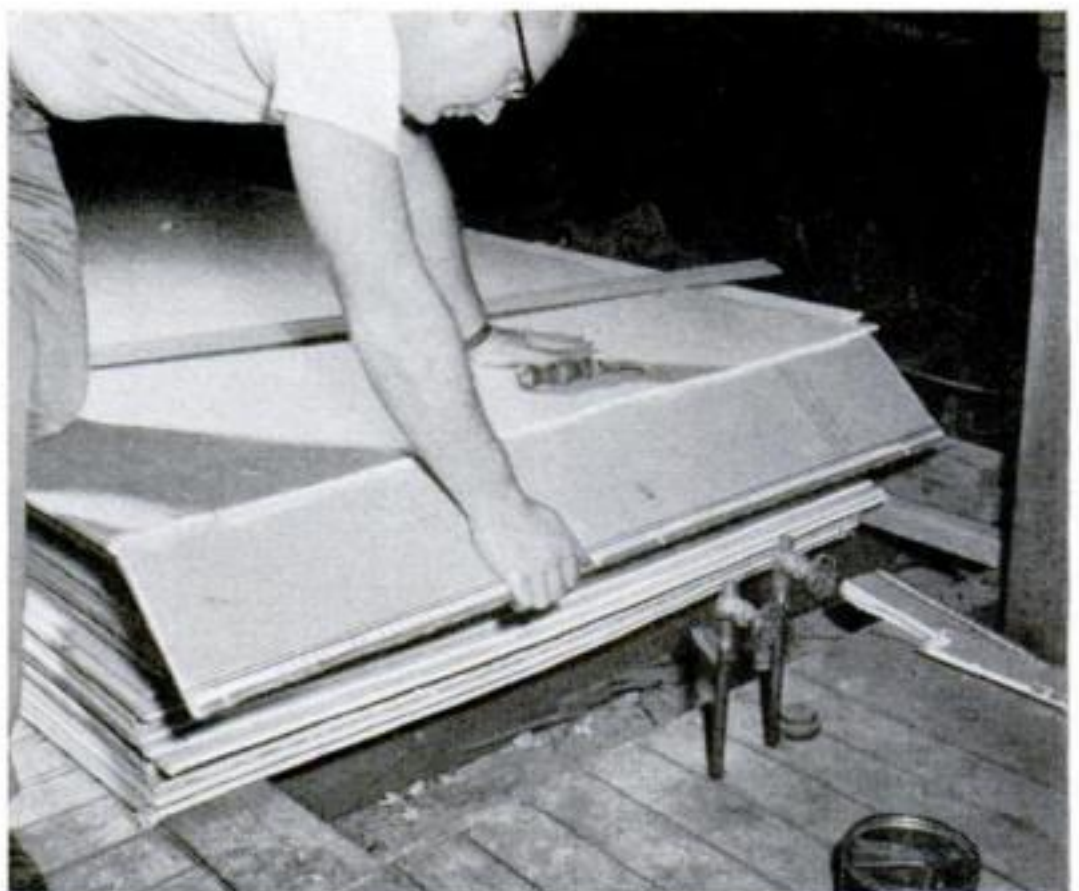
The finished wall can be textured in any one of the several ways shown to hide nails and joints, or can be wallpapered. If you're going to paper, be sure to prime the wall first with varnish, or the wallpaper will stick so firmly to the paper face of the plasterboard that you'll never be able to remove it without damaging the wall.

This is paint? The new textured paints are thick, pastelike compounds that look more like plaster and give similar results. They come in a variety of colors and in water-, rubber-, and oil-base types.

Simply brushed on and allowed to dry, these paints form a hard, sandlike finish that hides blemishes in both plaster and plasterboard. Or you can handle the paint in various ways to get different textures as shown in the photos.



1 Running sheets crosswise gives greater strength, fewer seams. Start panels at top of wall. Use broad-head wallboard nails, spaced 5" to 7" apart. Countersink each nailhead slightly to make hollow for patching cement.



2 Sheets are trimmed with any sharp knife. Run knife along straightedge to score top face of panel and snap piece down to break core. Then score bottom face and snap piece back up, and it will break off cleanly.

TO PATCH WITH TAPE AND PLASTER



PANELING

3 To conceal joints, first fill seams with patching cement, then press perforated tape firmly into cement with wide-blade putty knife (above). Add enough more cement to embed tape fully and smooth out edges with blade.

4 Second coat of cement is applied to seam after first coat has dried. A wide plasterer's trowel is ideal for this. Feather edges out 6" to 8" on each side of tape to blend with wall. Fill all nailheads flush with face of panels.

5 Ceiling joints are covered in same way as other seams except that tape is first creased down middle to form angle that fits in corner. For smoothest appearance, seams and nailheads should be sanded after cement is dry.

6 New corner beads have metal reinforcements on back side of tape, making strong joints that won't chip or crack if accidentally bumped. Beads come for inside and outside corners (inset), are cemented like regular tape.

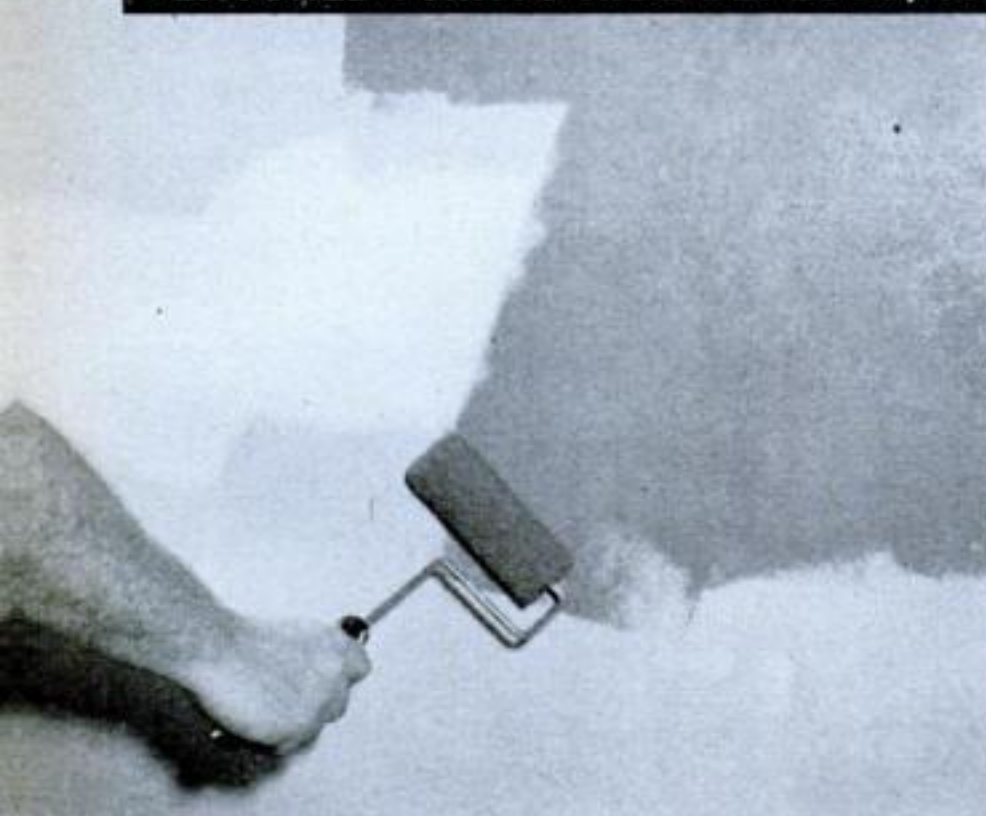
Please turn the page for more wall-finishing photos. JANUARY 1954 207



New glue-on panels are cemented to wall instead of nailed, eliminating fuss of patching seams and nailheads. They can be put right up over old walls or over a backing of regular plasterboard in new walls. Cement is applied

with special notched spreader that leaves three ribbons on back of panel (left). Panel is then pressed onto wall and tamped tightly against preceding panel with two-by-four (right). Panels come white for painting or in colors.

TEXTURED PAINTS HIDE DEFECTS, GIVE MANY DIFFERENT FINISHES

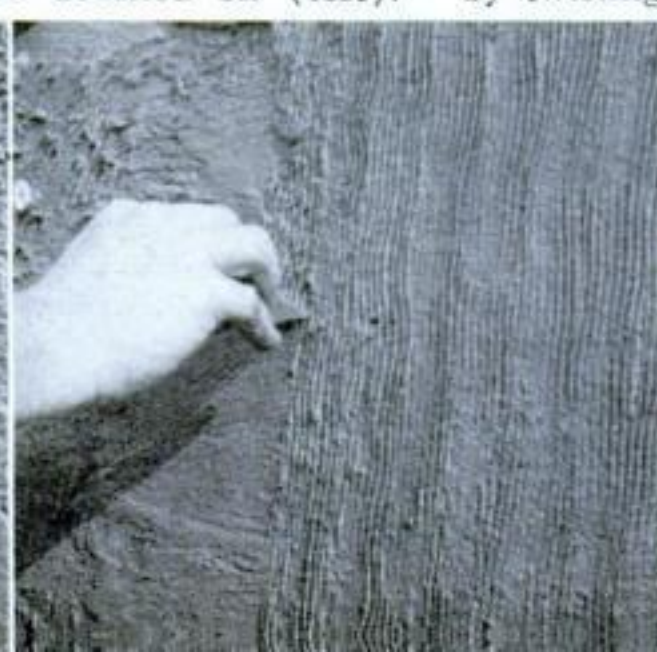


1 Thick, pastelike textured paint easily hides seams and nailheads in plasterboard even when not sanded smooth, as here. Using roller helps spread paint evenly, provides slight stipple effect that can be left as is.

2 Over plaster wall, textured paint fills in small holes and trowel marks, giving surface a smoother appearance. Paint is worked into plaster with brush, and can then be left as is for sand finish or given a texture.

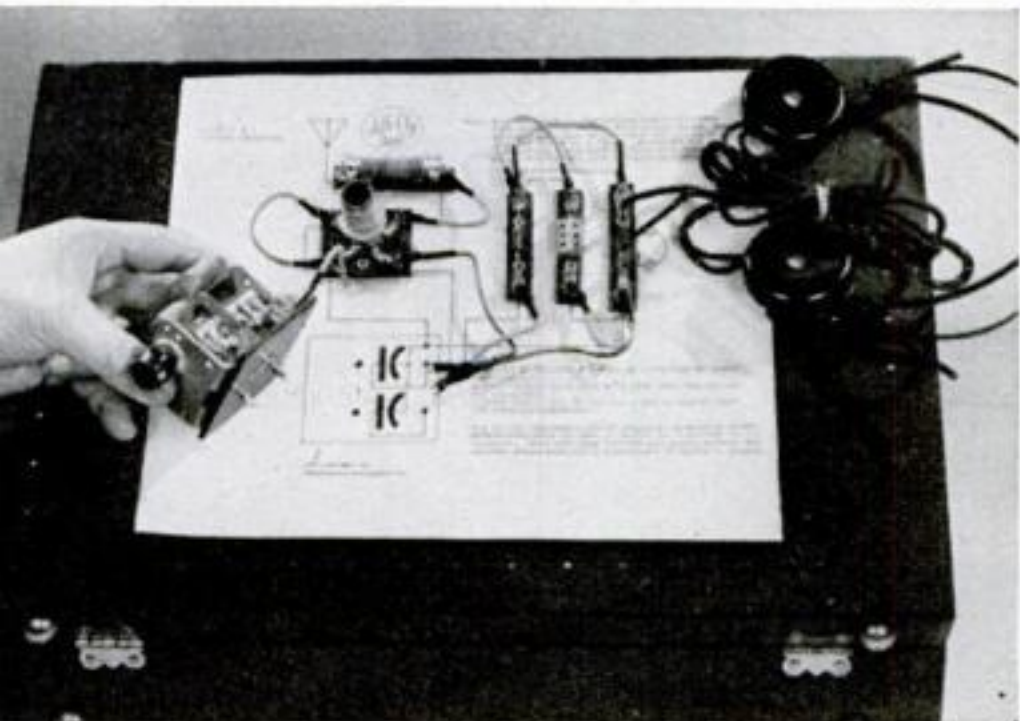
3 Paint can be textured on either plaster or plasterboard walls in several easy ways as shown below. You can get a heavy, stucco-like stipple by simply daubing paint with sponge after thick coat has been brushed on (left).

Modern striated effect is obtained with wide-tooth hair comb (center). Wavy lines can be made by twisting comb as you move it along. Swirls and other freehand designs can be made by twisting a stiff-bristled brush (right).





PARTS ARE LAID OUT on perforated panel that forms one side of suitcase-shaped kit. Open, easily accessible arrangement makes it simple to run quick checks and substitute parts.



PAPER TEMPLATE has punched holes through which parts are plugged into panel. Diagram shows location of each part by number as well as symbol. Circuit shown is crystal set.

STORAGE BOARD holds spare parts in numbered order so each can be quickly taken out and put back in same spot. Connecting wires with spring-clip tips are in left foreground.



Plug-In Parts Build 24 Radios

Solderless circuits assemble fast, let you change sets like a suit of clothes.

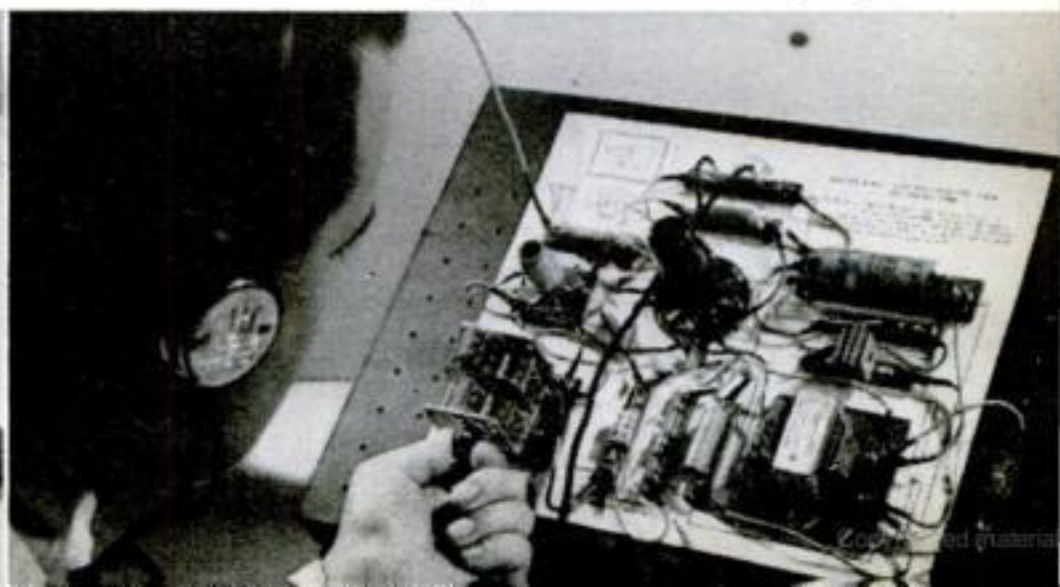
YOU can set up any one of 24 different radio circuits as fast as you can plug in the parts. When you are through with one circuit, it takes only a few minutes to unplug the parts and reassemble them into another one.

You do this by arranging a kit of tubes, condensers and other parts in various combinations on a layout panel. Each part is mounted on a pronged base that fits into holes in the panel. You can't make a mistake because there's a punched template for each circuit that fits over the panel and shows exactly where each part goes. Connections are made with spring-clip solderless leads that are simply slipped on and off terminal posts on each base.

Beginners can progress from a simple crystal set to a two-tube amplifier in a few hours, learning the function of each circuit as they go along. Engineers can set up test circuits in minutes instead of days of intricate fitting and soldering.

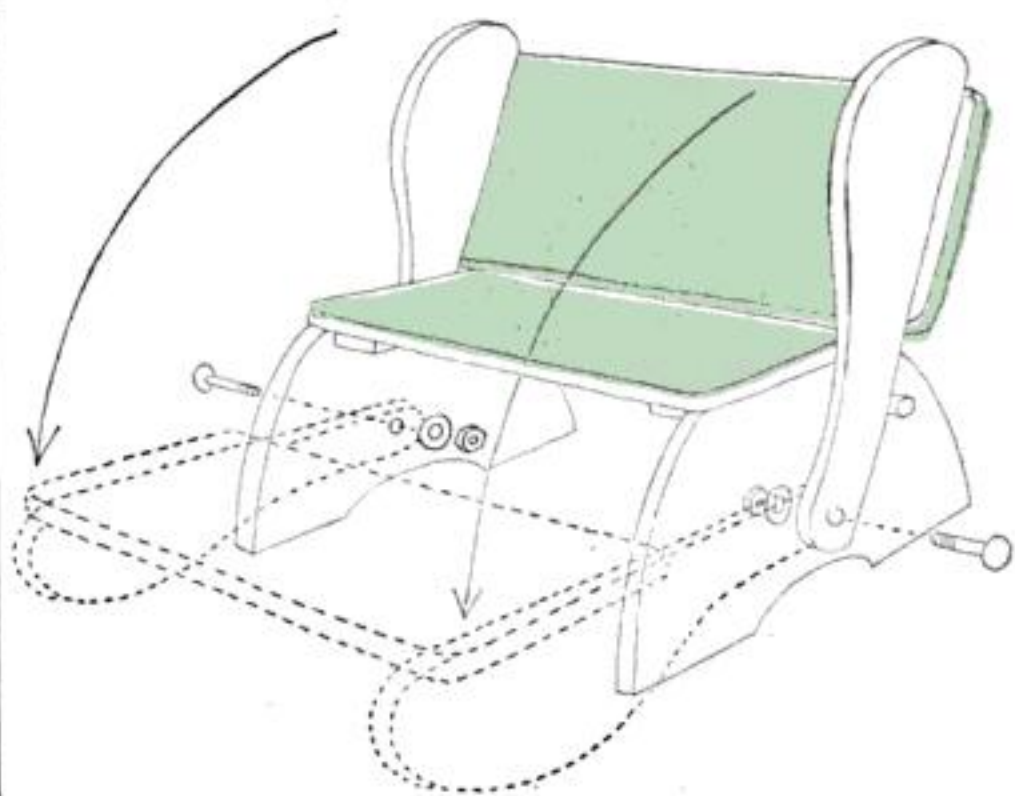
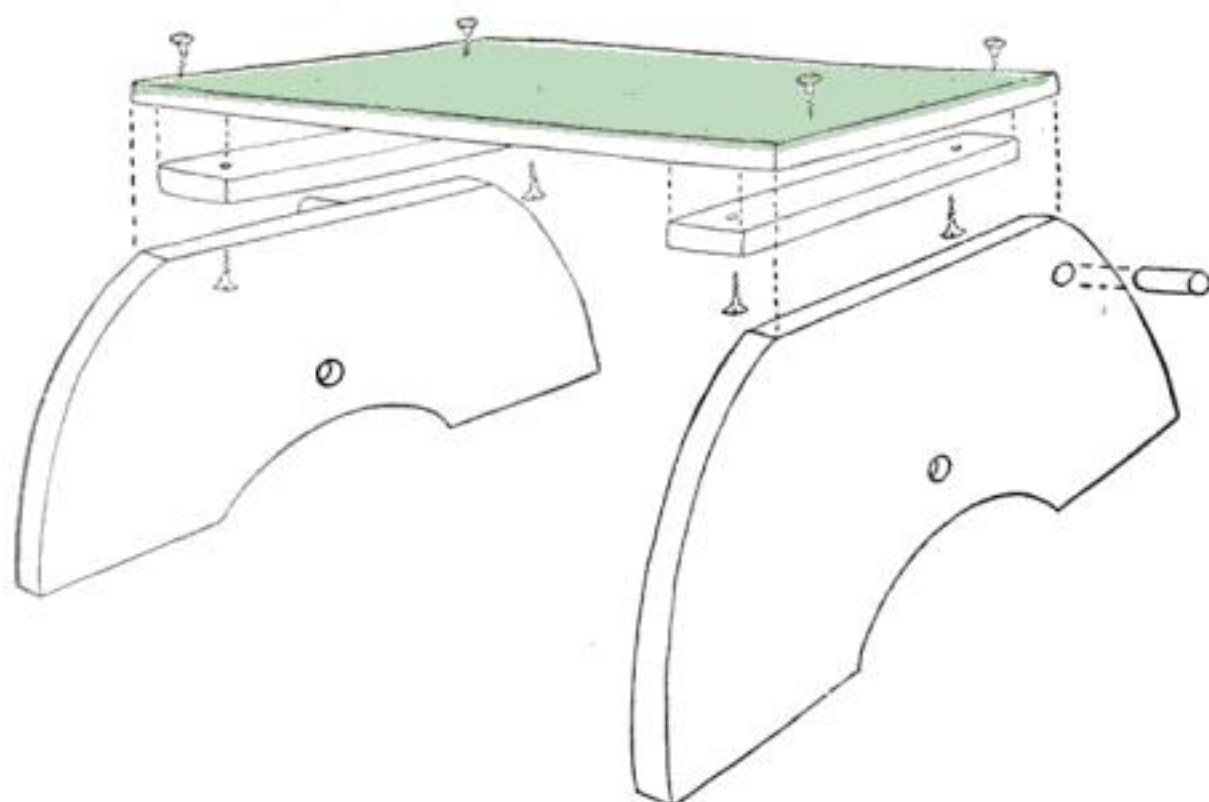
The kit of parts is made by Science Electronics, Inc., Box 237, Huntington, N. Y. Also available are blank plug-in bases and extra connectors so experimenters can make up their own circuits.

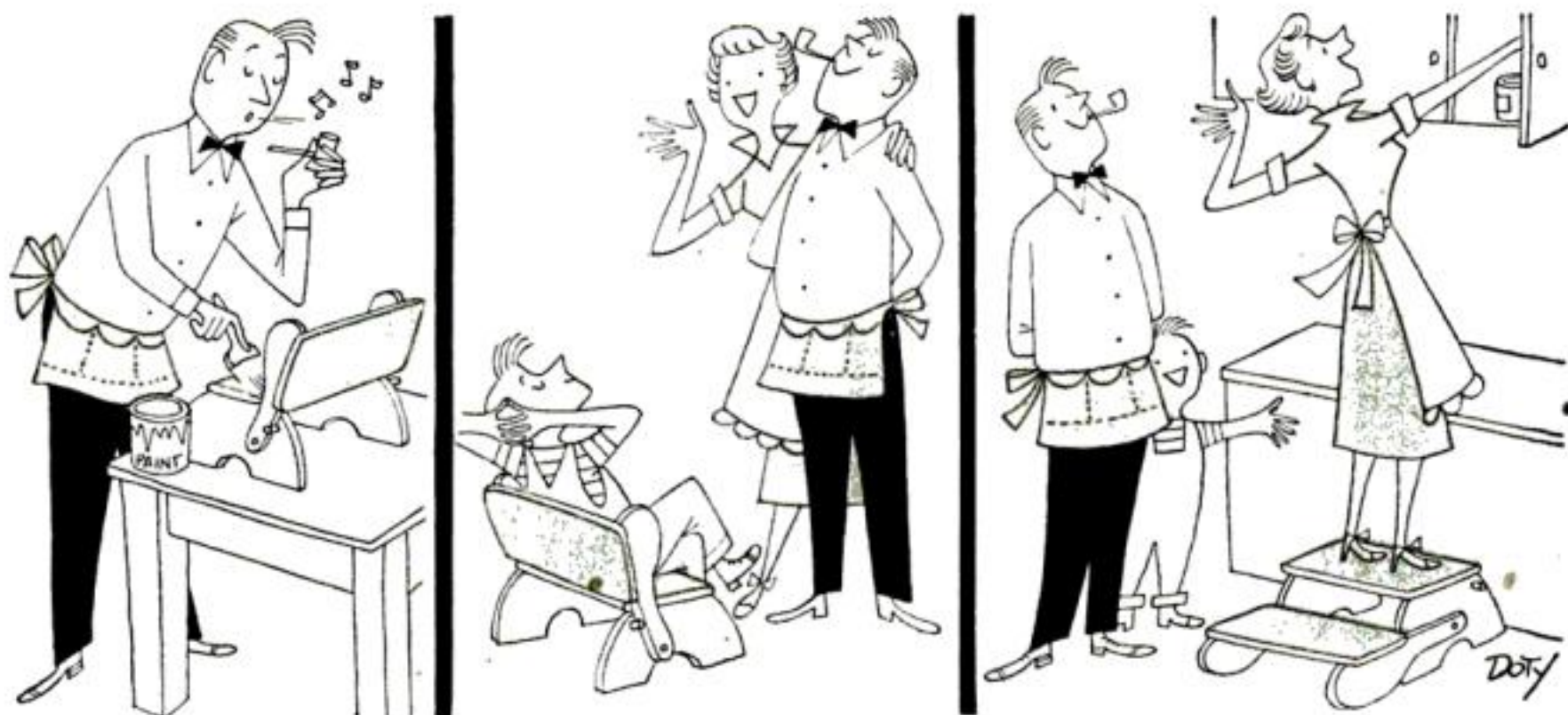
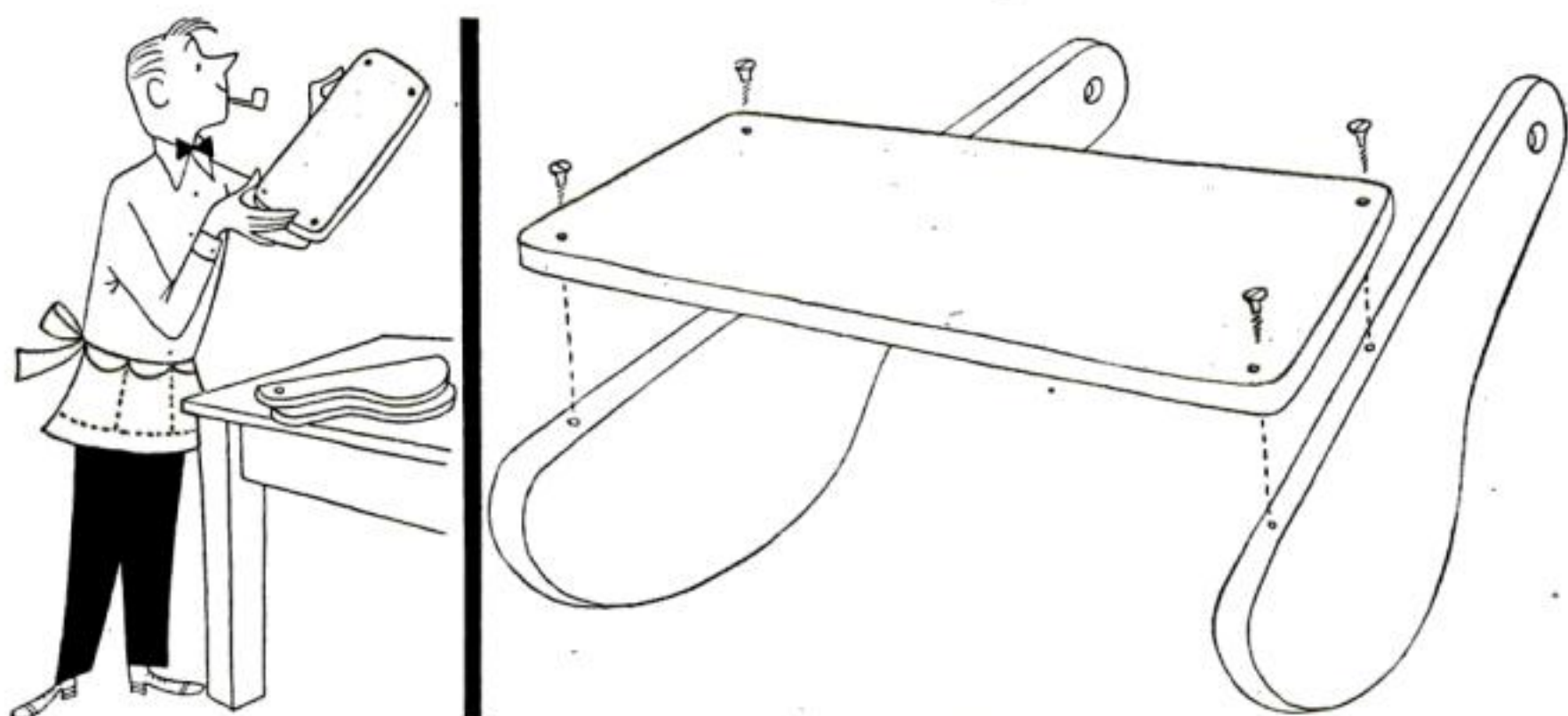
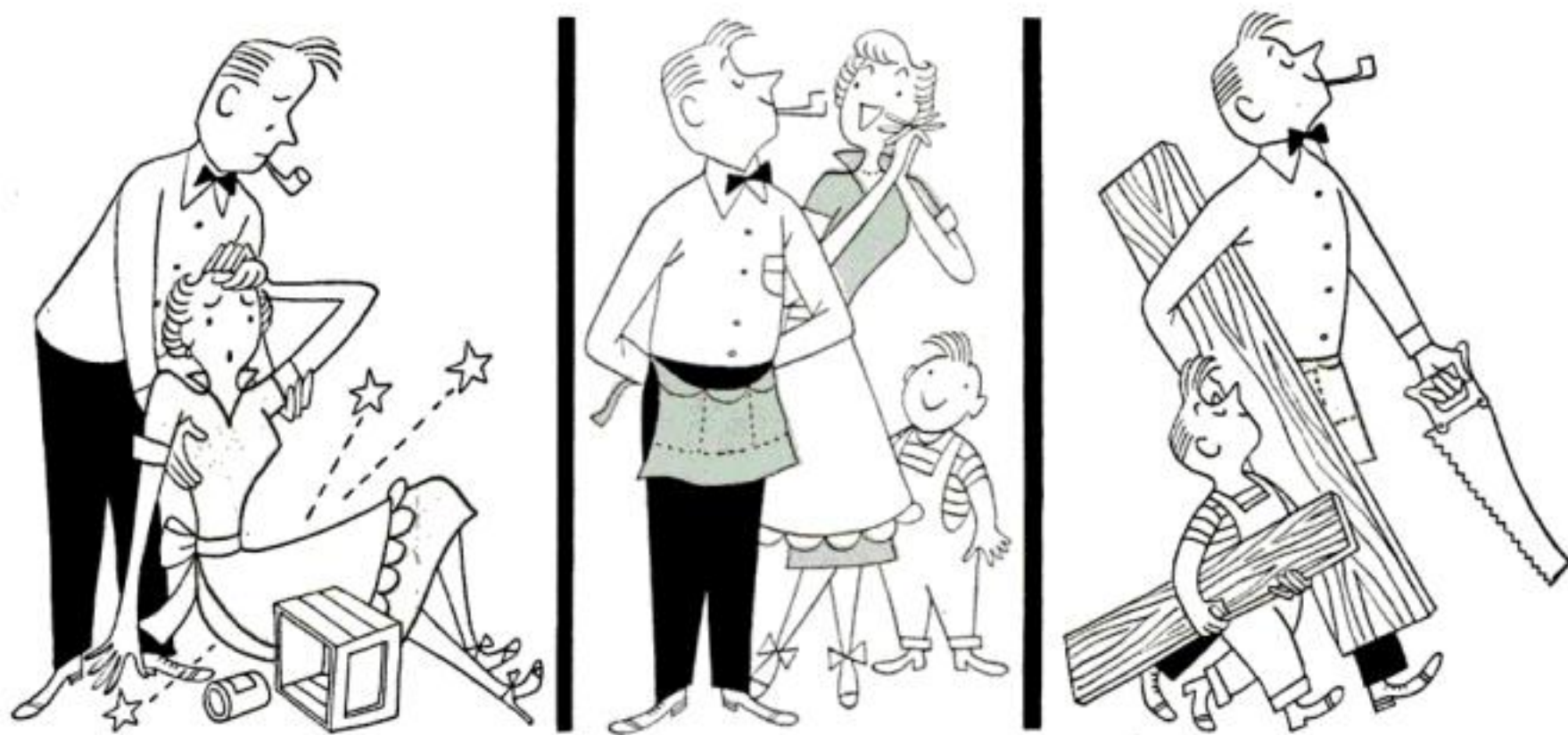
SINGLE-TUBE SET is one of two dozen that kit will build. Circuits can be arranged for either battery or external-power operation. Parts include line-cord clip, even antenna plug.



By Roy Doty and Edwin F. Thomas

Wordless Workshop





Next Month: a footstool that stores firewood.

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Slant-Front Drawer Is Pulled Out by Its Clapboard-Like Face

THERE'S no hardware tacked on the front of my cabinet drawers, but they are easy to open just the same. The front of each drawer slants out like a clapboard, with a finger grip rasped out on the underside. The slant was obtained by simply cutting one end of the sides at a 10° angle. Grooves cut in each side of the drawer ride on cleats in the cabinet.—*Jerry Parker, Sonoma, Calif.*



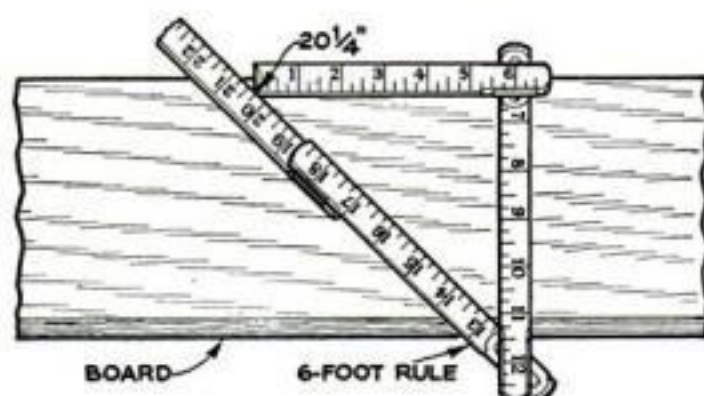
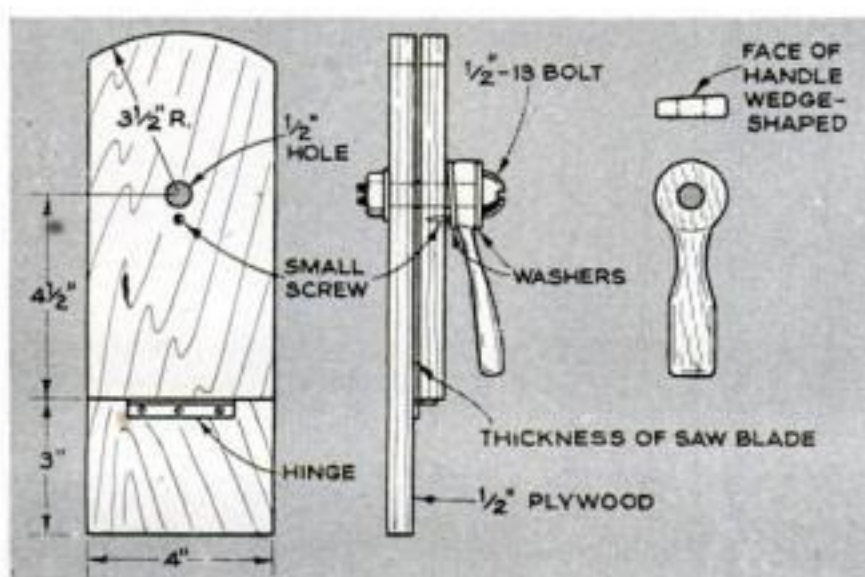
Saw Clamp Is Quick-Acting



A QUICK-ACTING clamp lever on this saw-filing clamp lets you rotate the blade as fast as you can file teeth, yet it locks it securely while you file.

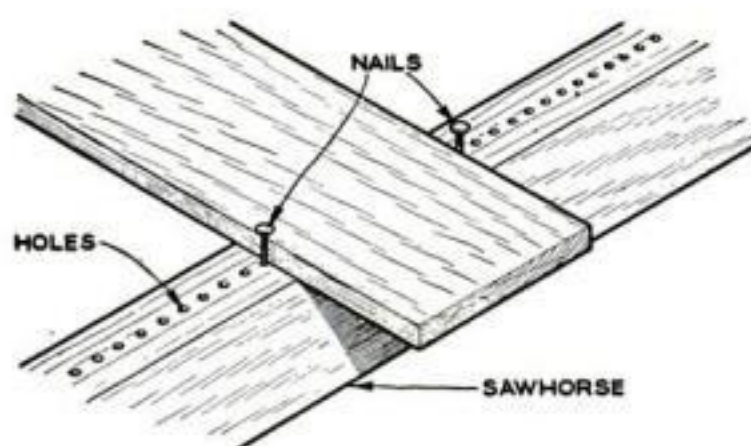
Cut two pieces of $\frac{1}{2}$ " plywood to make the body of the clamp.

Hinge the two parts and bore a $\frac{1}{2}$ " hole at the radius centerpoint for a $\frac{1}{2}$ "-13 bolt. Shape the handle from hardwood and file the inside face to a slight wedge shape. In use, the wedge rides up on the head of a screw placed close to the bolt hole, forcing the clamp tight against the saw. A twist of the wrist loosens it. Steel washers prevent the wood handle from being scored by the screwhead.—*Will Thomas, Buffalo, N. Y.*



Rule Serves as Square

IF YOU need a square and don't have one handy, you can improvise one (above) from an ordinary folding rule. Bend the first two sections so that the zero end just touches the $20\frac{1}{4}$ " mark. The resulting triangle will form a right angle.—*Lewis Booker, Louisville, Ky.*



This Sawhorse Won't Shy

BOARDS stay in place for sawing with only a slight downward pressure of the hand when the top of a sawhorse is drilled at close-spaced intervals and nails are inserted in two holes, one on either side of the stock being cut.—*William B. Eagan, Louisville, Ky.*



How to Keep Things Up

CRA-A-ASH! This embarrassing accident won't happen to you if you match your fasteners to the load they're going to carry and the kind of wall you're going to fasten it to.

Here's the low-down on fastening anything from a pin-up to a whatnot. The secret: know your wall, your load, your fastener.

IF YOU'RE the man in the house, inevitably there comes a time when you must fasten something to a wall. The object may be anything from a calendar to a cabinet. Whatever the object, there's no reason the job should stump you.

Fortunately American manufacturers have provided special tools and devices to help you. But before you start, answer three questions:

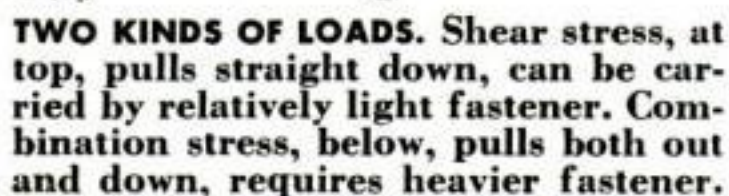
- What is to be fastened to the wall?
- What kind of a wall is it?
- What type of fastener is best?

What is to be fastened? Basic, of course, is the weight of the object you're going to fasten to the wall. Anything under five pounds is a light load; anything over 25 is heavy.

But, regardless of weight, everything fastened to a wall falls into one of two classes:

Shear stress. Flat objects, such as pictures, mirrors, pin-up lamps, clocks, etc., exert a straight-down pull.

Combination stress. Objects such as towel racks, drapery rods, can openers, shelves



What kind of a wall? What your wall is made of and how thick it is determine the type of fastener to be used. If you don't know, find out by removing an appliance where a raw edge will show.

Plaster walls. These may be plaster over wood lath, plasterboard, plaster over plasterboard. In remodeled rooms we may

Tile walls. These may be faced with ceramic tile, imitation ceramic, metal or plastic tile. Thin sheets of marble are often set in a plaster backing like tile.

What type of fastener? *Adhesives* will carry light loads. Some handy new gadgets, such as hooks and towel racks, carry their own adhesive. You merely moisten, press in place and hold for a minute or two, then let set for a few hours.

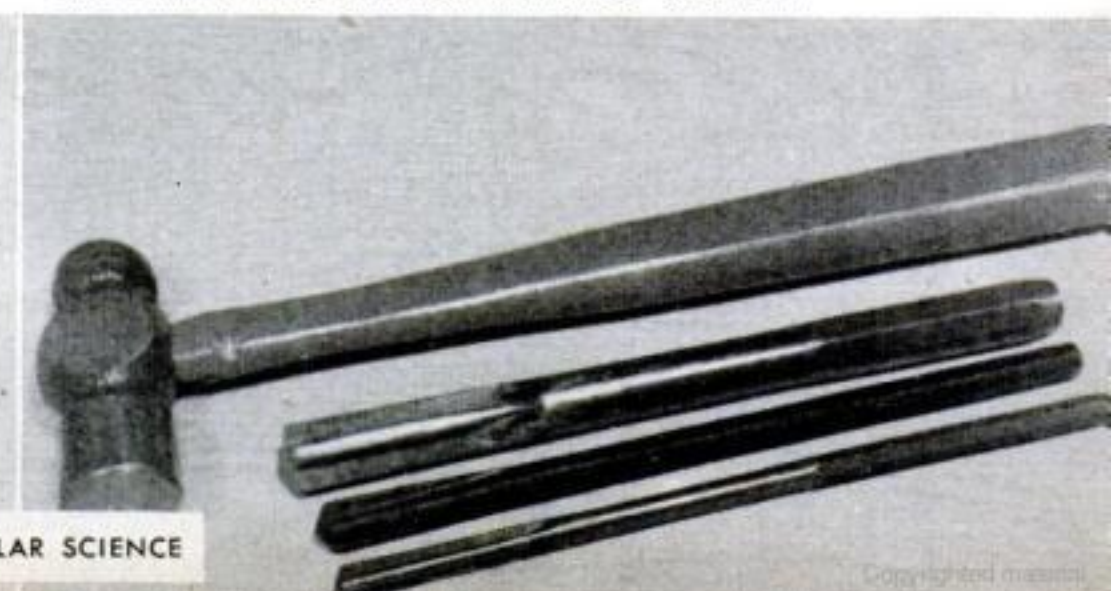
But remember that you are fastening to the surface only, usually to a layer of paint or varnish, and cannot expect too much strength. Also, if you take it off later, you'll have to refinish the wall. Adhesives are especially useful with ceramic tiles, which are brittle and easily cracked. They can be drilled but the operation is risky. It is much better to use cement. (Don't confuse adhesive cement with the cement used for setting tile.) If the object will not adhere, chip off the glazed face of the tile with a sharp punch. Then cement it again.

Thumbtacks or pushpins may be used to fasten very light objects such as calendars, pictures and ornaments to wood and plaster walls. There is, however, always the danger of chipping plaster with even the smallest driven fastener, although driving it through a piece of adhesive tape will lessen the risk.

Thin brads and nails may be used for light or medium objects having shear stress on wood or plaster walls. But picture nails are better. They are held at the proper angle, are specially pointed to penetrate plaster, and are available in sizes to hold up to 30 pounds. Nails and brads should be driven in at an angle of about 45° for greatest strength.

Masonry nails will hold light and medium weights on brick, stone and concrete.

STAR DRILLS resemble impact drills but have four cutting edges instead of three. They are used with the heavier hammer shown.



block walls. They may be driven readily into mortar, bricks or concrete blocks, but may chip or crack poured concrete.

Split nails also will hold medium or fairly heavy weights on masonry walls. They are driven into holes drilled at any desired point, the holes being slightly smaller than the solid shank of the nail. They also are available with a bolt head.

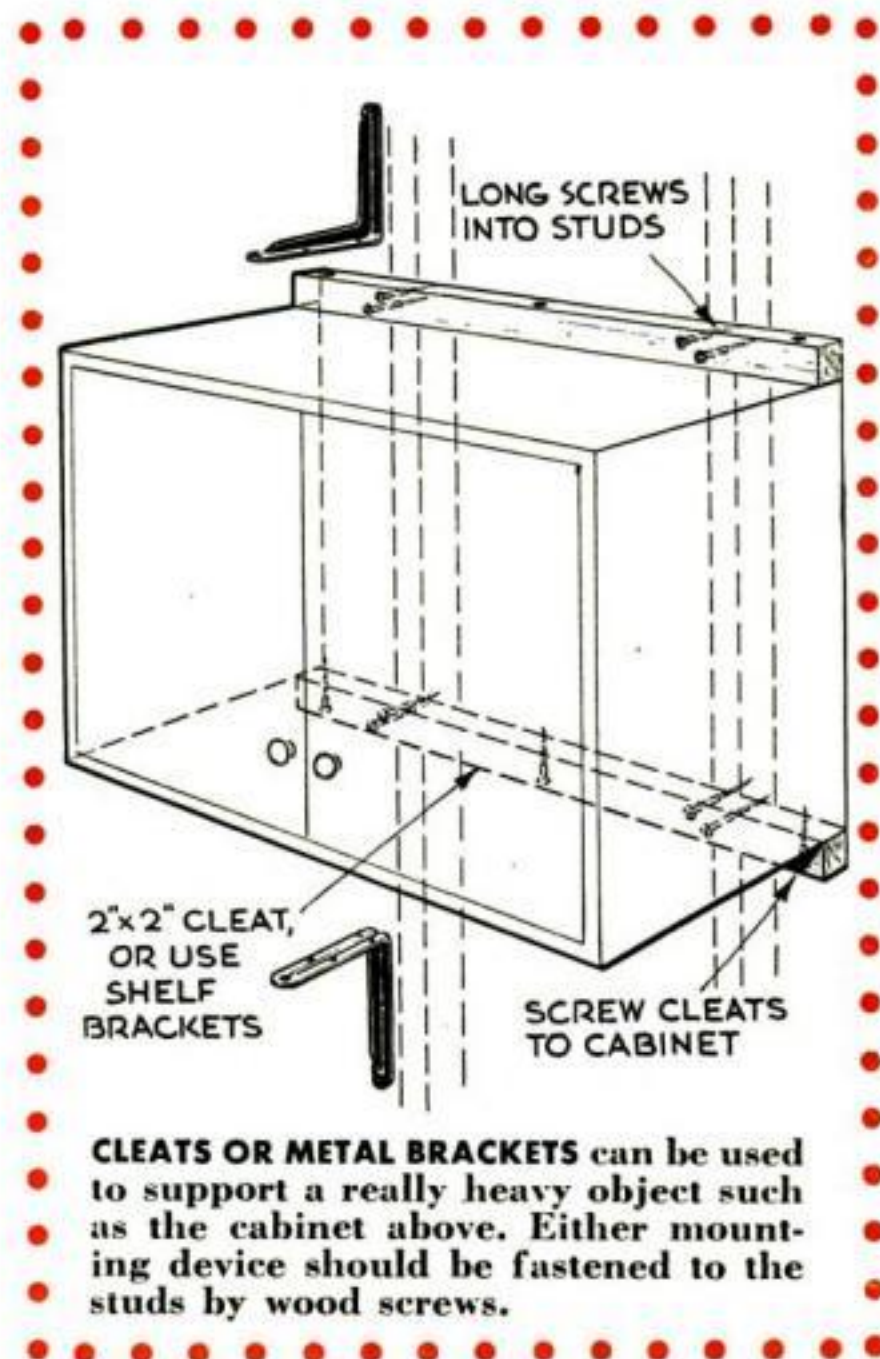
Screws provide greater strength and resist pull much better than nails. Driving a screw into soft wood, you'll find a hole made with an awl okay for very small screws. Larger screws should be driven into pilot holes to assure straightness and full strength. Make your hole about three-fourths the diameter of the screw core for soft wood, nine-tenths for hard wood. The hole should be slightly shallower than screw length.

How to drill holes. Since drilling holes is important for both screws and bolts, let's take time out to run down the best tools and methods.

Twist drills will go through wood, plaster, metal, or even tile. Punch a dimple where you want the hole. Drill slowly and carefully at right angles to the wall. Don't press too hard, particularly on thin walls, or you may break away the inner surface. When you drill plaster or tile, use an old or cheap drill. Plaster will dull any twist drill very quickly.

But there's a better tool for drilling plaster: the impact drill. This works like a miniature air hammer. It chips away the plaster a little at a time, yet will make a neat, clean hole almost as quickly as a twist drill. It will make hundreds of holes before getting dull and can be sharpened quickly and easily on a grinding wheel. It can also be used on mortar, ceramic tile, brick and concrete.

Start the hole by tapping with a light hammer just hard enough to make the drill cut. If you tap too hard, the drill



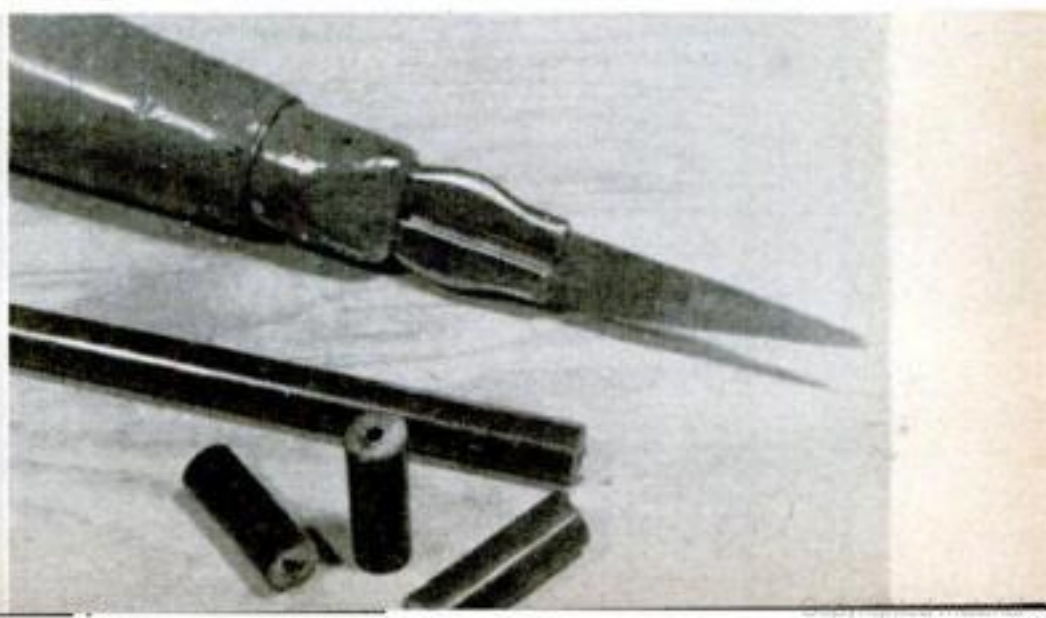
will jam. Rotate the drill about a quarter turn between taps. Don't let the drill wobble or you will get too large a hole. After you get the knack of rotating the drill, try lifting or jumping it each time you turn it. This helps to remove dust from the hole and speeds cutting.

When starting an impact drill in ceramic tile or concrete, first make a dimple the approximate diameter of the hole by chipping away the hard surface with a sharp punch. If you don't, the drill may fracture too large an area of the surface.

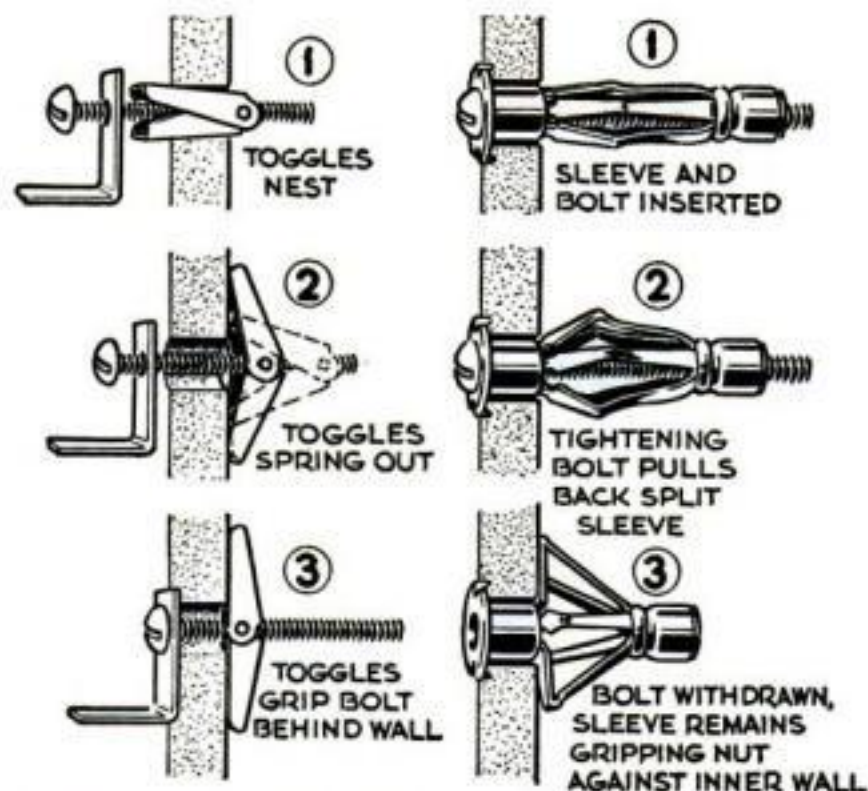
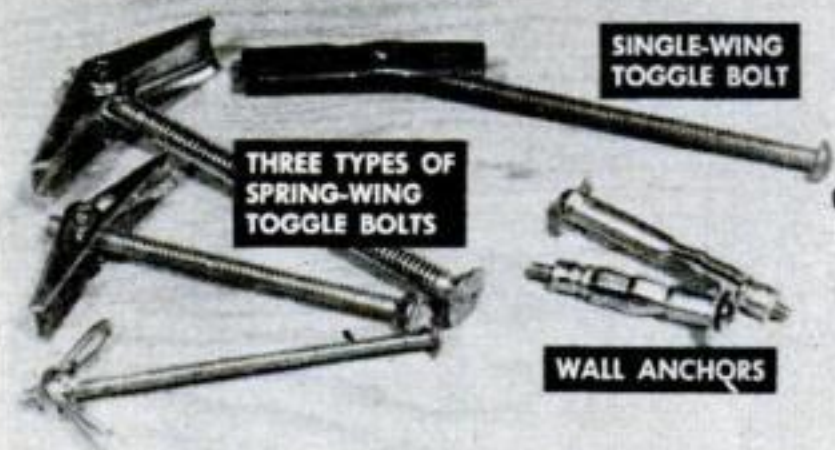
While you can drive wood screws into holes drilled in plaster, tile or masonry walls, they won't hold much. The threads

HOUSEHOLD KIT contains variety of most commonly needed fasteners. Widely available, the kit shows you different types.

MAKESHIFT SCREW ANCHORS for plaster walls can be made from lengths of a round wooden pencil. Push out leads with a wire.



Common Wall Fasteners

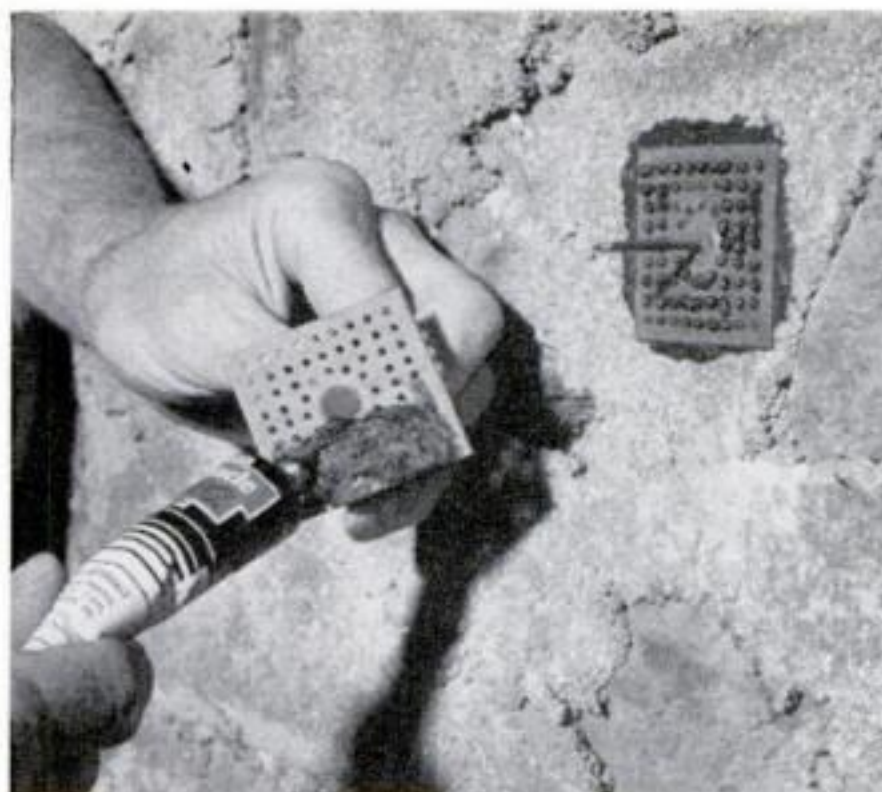


TOGGLE BOLTS AND WALL ANCHORS are used with heavy loads. Toggle's wings spread against the inner face of wall. Split sleeve of anchor bolt locks as bolt is tightened.

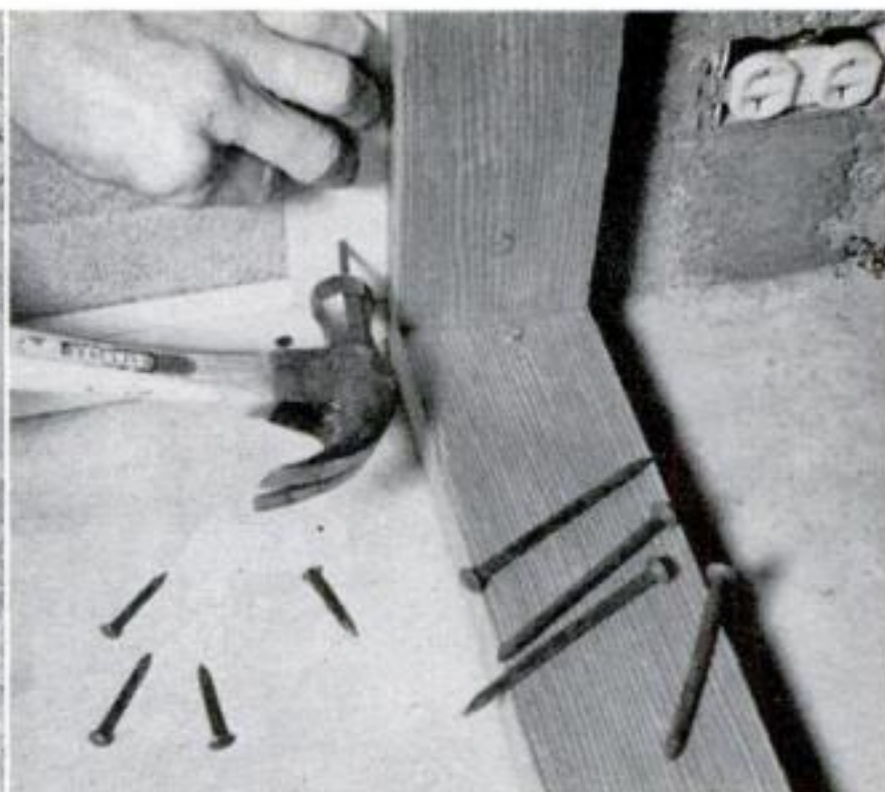
will crumble the material, or if the material is too hard, it will destroy the threads. Plaster screws, however, have deep threads the full length of the screw and will hold fairly well. Better still are handy devices called expansion shields. For light and medium work the shields may be made of fiber or plastic. One popular make of fiber shield—the Rowlplug—has metal-lined holes to prevent the screw threads from cutting the fiber. These also are available in large sizes for holding heavy screws in masonry walls.

To insert a wood screw into a plaster wall, select an expansion shield only slightly larger than the major diameter of the screw. Drill a hole in the plaster slightly smaller than the expansion shield and as deep as that part of the screw which will enter the wall. Select a fiber shield no longer than the threaded part of the screw (cut it off if necessary) and push it down to the bottom of the hole. The smooth shank of the screw should not enter the fiber shield. Forcing it in may twist off the head of the screw. If the hole goes through the plaster wall, insert the screw a few turns into the shield before inserting the shield in the wall.

Common sense is a pretty good guide as to size of screws to be used. Obviously there is no point in using a screw longer than the wall is thick. As a rule-of-thumb, we might use anything up to No. 4 gauge for light work, 5 to 8 gauge for medium, and anything over that for heavy. Actually, since



ADHESIVE-HELD ANCHOR NAILS can be used to hold furring strips to masonry. Smearred with mastic, anchor is pushed against wall with a twist. Next day, strip is driven against nail.



CONCRETE NAILS look like common type but are harder and tougher. Above, long ones are being used to fasten two-by-fours to a concrete wall; short, for furring strips.

you lose nothing by using a screw heavier than you really need, play safe.

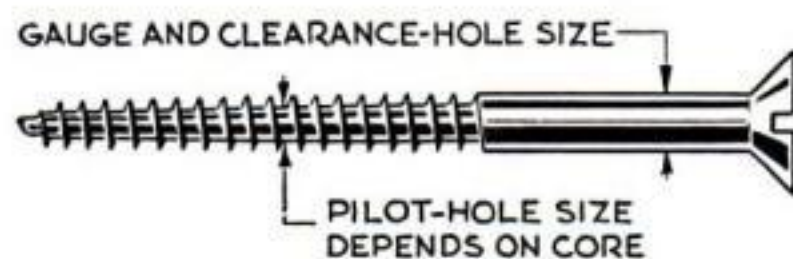
Bolts are useful, too. When you want to fasten something to a thin wall, a toggle bolt provides a handy solution. This device also may be used on thicker walls if screws will not hold. A hole slightly larger than the folded wings is drilled through the wall. The wings are removed so that the bolt can be passed through the object (for instance, a metal shelf bracket) to be fastened to the wall. The wings are then replaced, folded and passed through the hole in the wall. The single-wing type works much the same way. The wing is pivoted off-center on the end of the bolt, so that one arm is longer than the other. When inside the hole, the heavier part tilts down and permits drawing the wing flat against the wall. A toggle bolt cannot be removed without dropping the wing inside the wall.

Patented wall anchors are used like toggle bolts. One type, the Molly, consists of bolts fitted into sleeves having a threaded section at the far end, a slit and scored center section, and a plain rimmed section which passes through the wall. The fastener is inserted in the wall through a hole slightly larger than the tube and the bolt is tightened. This causes the slit section to expand, anchoring the device inside the wall. The bolt is then with-

drawn and passed through the object to be fastened, then reinserted in the wall. Besides being removable, the wall anchor does not need as large a hole as a toggle bolt. It can be removed by forcing the expanded section back to its original shape with a long punch or nail, but cannot be re-used.

Fastening heavy objects. Other types of wall anchors, inserted in holes drilled in the masonry, are useful where heavy objects must be fastened to masonry walls and floors with removable bolts or machine screws. The expansion-shield types have internal nuts which expand the split shields when the bolts are tightened. There are many variations of the anchor types having either split or soft lead shields. Some are tightened by the bolt action, some by hammering the rim with a special tool or piece of pipe. One variety is made so that you insert the bolt head down, leaving the threaded stud extending from the wall.

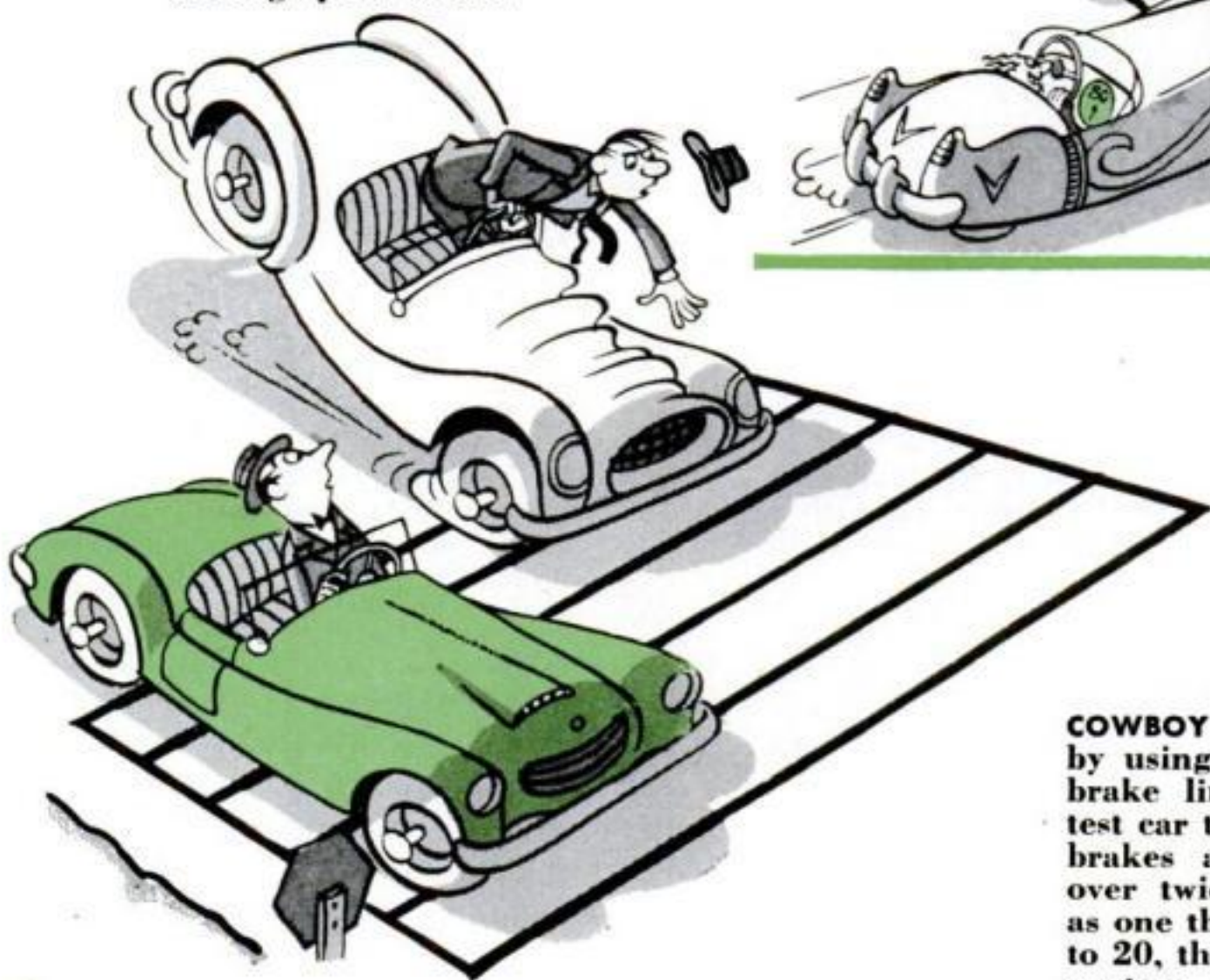
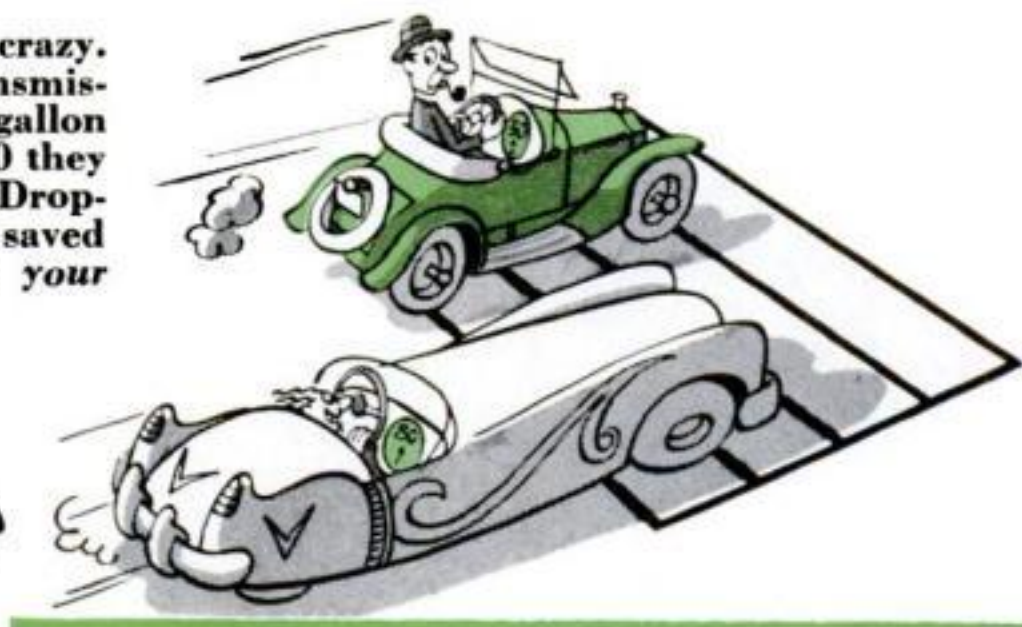
Screws in lead expansion shields are another good fastener for heavy loads on masonry walls. These work just like wood screws with expansion shields. Shields are available to take wood screws or the heavier lag screws which are tightened with a wrench. Lag-screw shields are marked with the diameter of the screw



SCREW CLOSE-UP shows how sizes of pilot hole and clearance holes are determined.

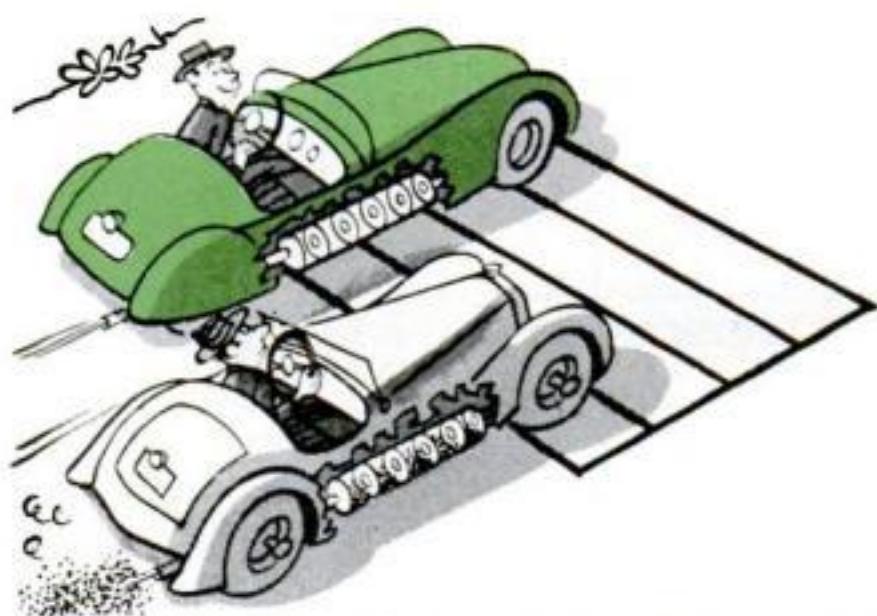
[Continued on page 248]

FAST DRIVING gulps gasoline like crazy. Two test cars with standard transmissions got 19 to 21.5 miles to the gallon at 40 m.p.h.; 16 to 17 at 60. At 80 they got a scant 11 miles to the gallon. Dropping cruising speed from 60 to 50 saved about 12 percent on gas. *Keep your driving speed down.*

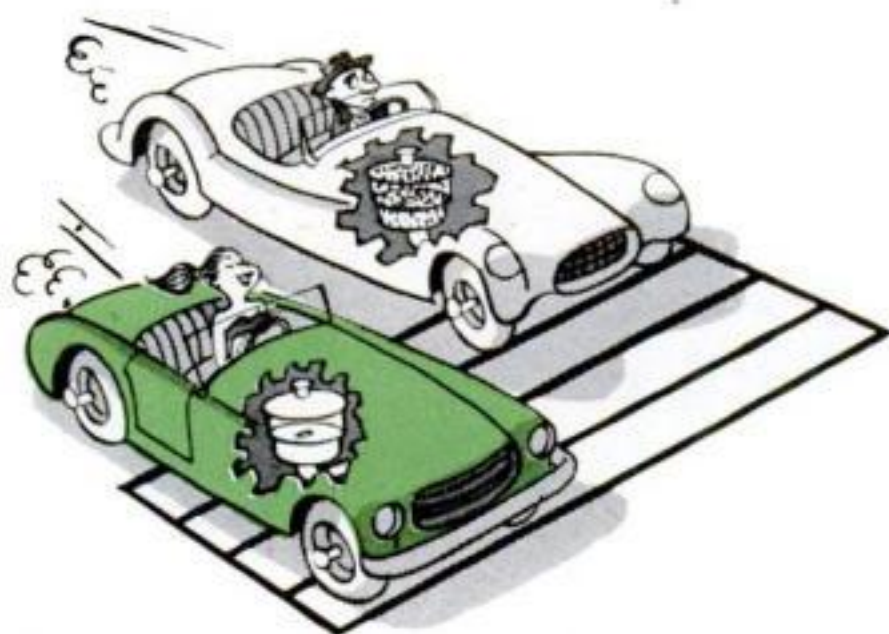


COWBOY STOPS waste fuel by using its energy to heat brake linings and tires. A test car that jammed on the brakes at 40 m.p.h. used over twice the gas to stop as one that coasted from 40 to 20, then braked gently to a stop. *Slow down slowly.*

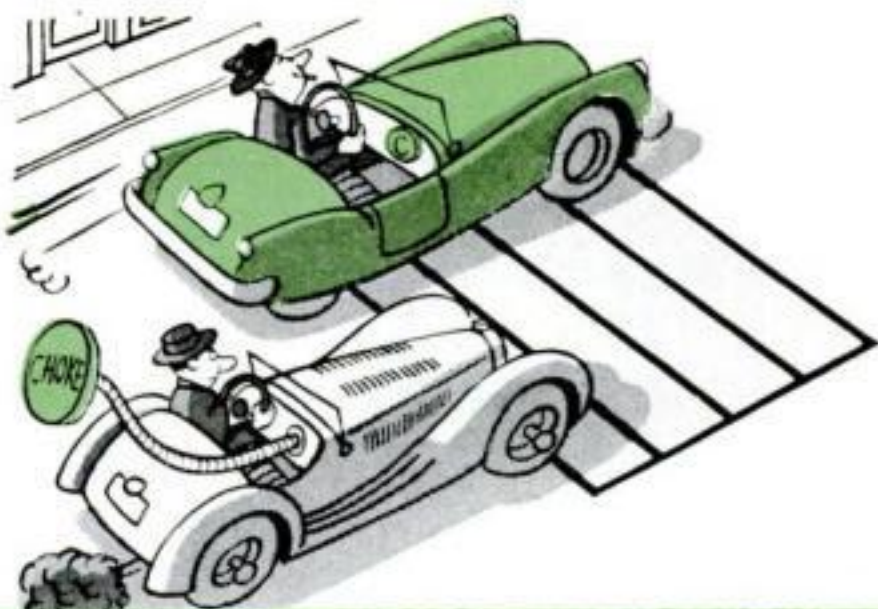
Eight Ways to Save Gasoline—and Dollars



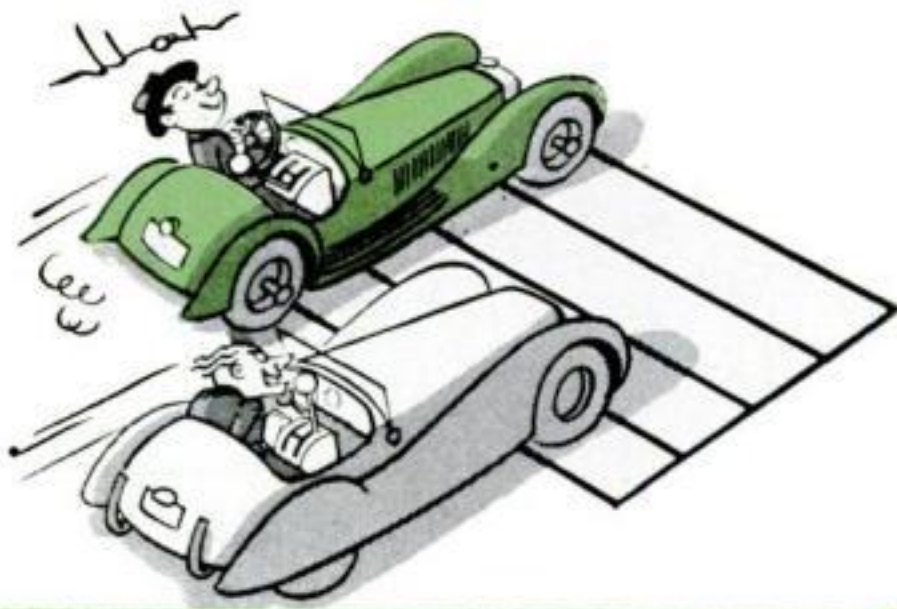
A DIRTY MUFFLER gives you a dirty deal. It builds up exhaust back pressure, and every pound per square inch steals slightly over two percent of your power. Fuel use climbs about three percent for 1 p.s.i. of back pressure; five percent for 1.4 p.s.i. (A straight-through muffler ups power, changes fuel use little.) *Keep muffler clean.*



A FILTHY AIR CLEANER makes your car "breathe" hard—and wastes fuel. In the 20-to-60-m.p.h. range, a really dirty cleaner costs about 1.5 miles to the gallon. The test used an oil-wetted, screen-type cleaner fouled with the dust from driving 200 miles on a gravel road 30 yards behind another car. *Have your filter cleaned twice a year.*



CARELESS CHOKING can keep you heading for a filling station. If a hand-choke knob is out more than $\frac{1}{4}$ "—15 percent—you lose money. With choke 40 percent out, a car made only eight miles to the gallon, compared to 21.5 miles with choke all the way in. (Defective automatic choke could cause similar losses.) *Use your choke as little as possible.*



JET GETAWAYS are fine for the fly boys—but will cost you gasoline. Accelerating at wide-open throttle costs you more gasoline than at part throttle. Fuel consumption is highest in first gear, lowest in third. So the more you can stay in third, the more gas you'll save. *Accelerate at part throttle—and accelerate in third as often as possible.*

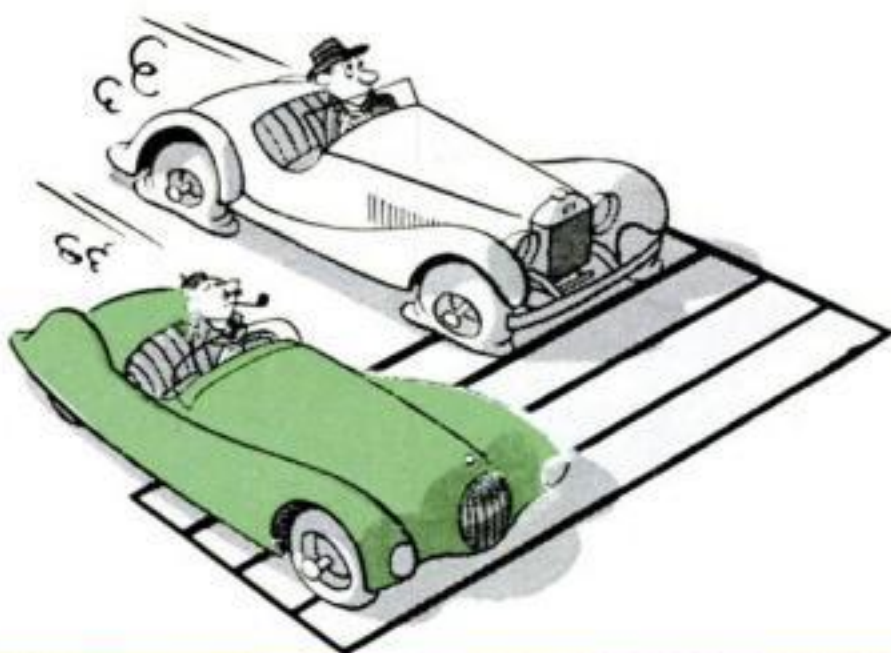
**Good driving can cut your fuel bill by as much as one-third—
and looking after your car properly will add even more economy.**

AUTO designers are putting some fancy engineering into making your engine run more miles on less gasoline. But there's one vital part they can't redesign—you. And often it's this part behind the steering wheel that wastes the most gas.

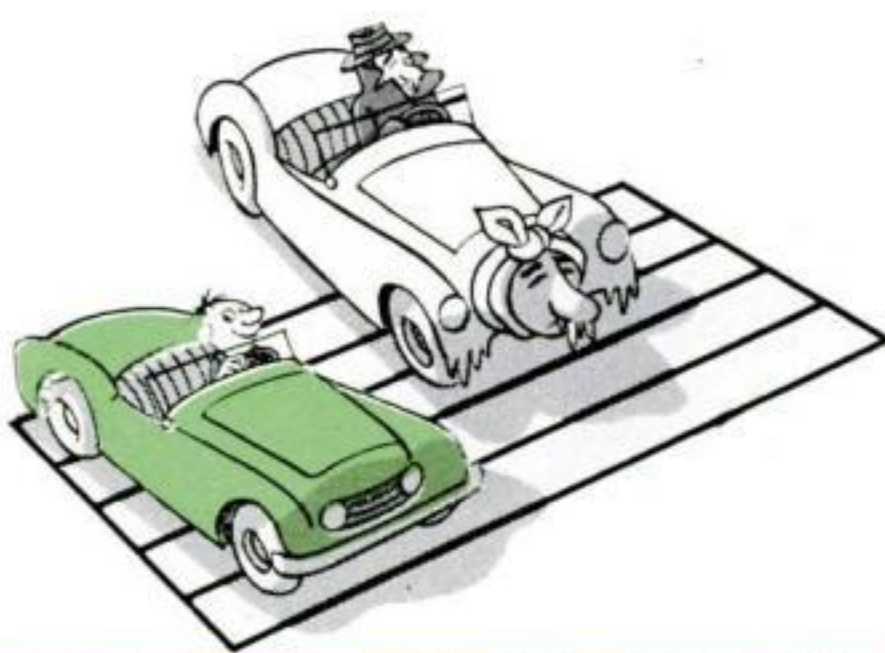
Just how careless driving and maintenance spill fuel down the drain is shown here. The drawings are based on a report to a section of the Society of Automotive Engineers by three Ford researchers—

H. S. White, O. Enoch, and A. L. Haynes.

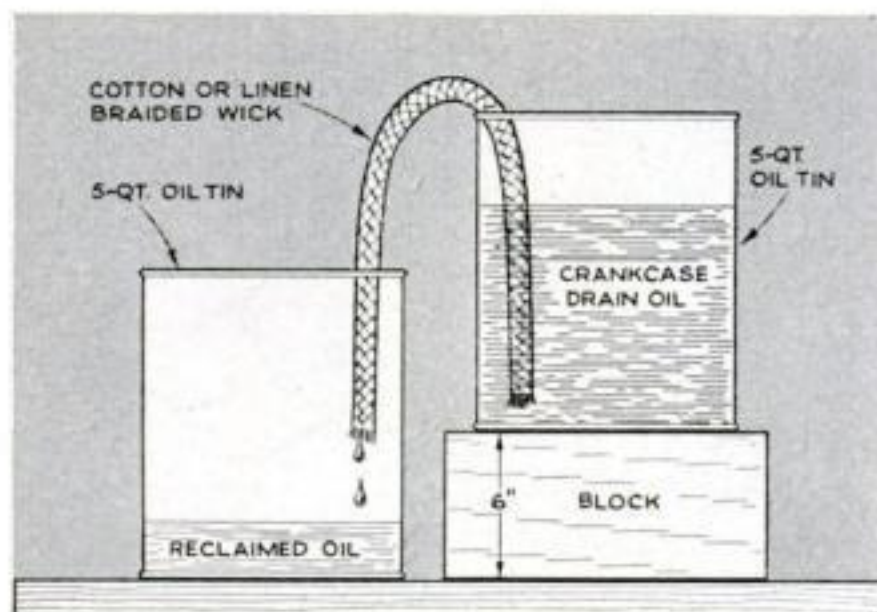
Actually, even with perfect driving, only about one gallon of every six you buy does useful work pushing your car. The other five are eaten up largely by friction and heat losses. But the report shows that driving habits can make a lot of difference in how far that working gallon takes you. Driving the same cars over the same mail run, good drivers averaged 15 miles to the gallon; poor drivers, only 10.



LOW TIRE PRESSURE means high gas consumption. A car running 30 m.p.h. with a normal load wastes about 15 percent of its power for every four pounds the tires are underinflated, due to increased road friction. At 20 pounds per square inch, tires absorbed 7.6 brake horsepower; at 28 p.s.i., only 5.76. *Keep your tires properly inflated.*



COLD ENGINES are gas-hungry engines. It takes about five miles for a car to warm up after a cold start. A car left in the open used about 15 percent more fuel than when its engine had been prewarmed to the temperature of a garaged car. The outdoor car also took twice the distance to warm up. *Keep your car garaged in cold weather.*



Wick Reclaims Crankcase Oil

You can reclaim some of the many quarts of good, usable oil you throw away each year. It still is fine for shop use. Next time you drain your car oil, pour it into a 5-quart can and set it up on a block beside an empty 5-quart can. Make a wick of linen or cotton strips braided into a rope about as thick as your thumb and lay it over the edge of the full can so that one end rests in more than half the depth of the oil and the other dangles in the empty can. The oil will creep along the wick by capillary action, filtering out the sediment as it goes. Any water or gas in the oil will evaporate.—*D. R. Gladish, Cape Girardeau, Mo.*



Machine Tape Makes Memo Pad

A ROLL of adding-machine tape about 3" wide, a wire coat hanger, a 6"-by-10" piece of hardboard and a hacksaw blade will make a handy memo pad for kitchen or shop. Cut and bend the wire to form an axle for the tape roll, bolting it to the top of the hardboard. The hacksaw blade is bolted to the bottom, teeth down, for tearing off the tape.

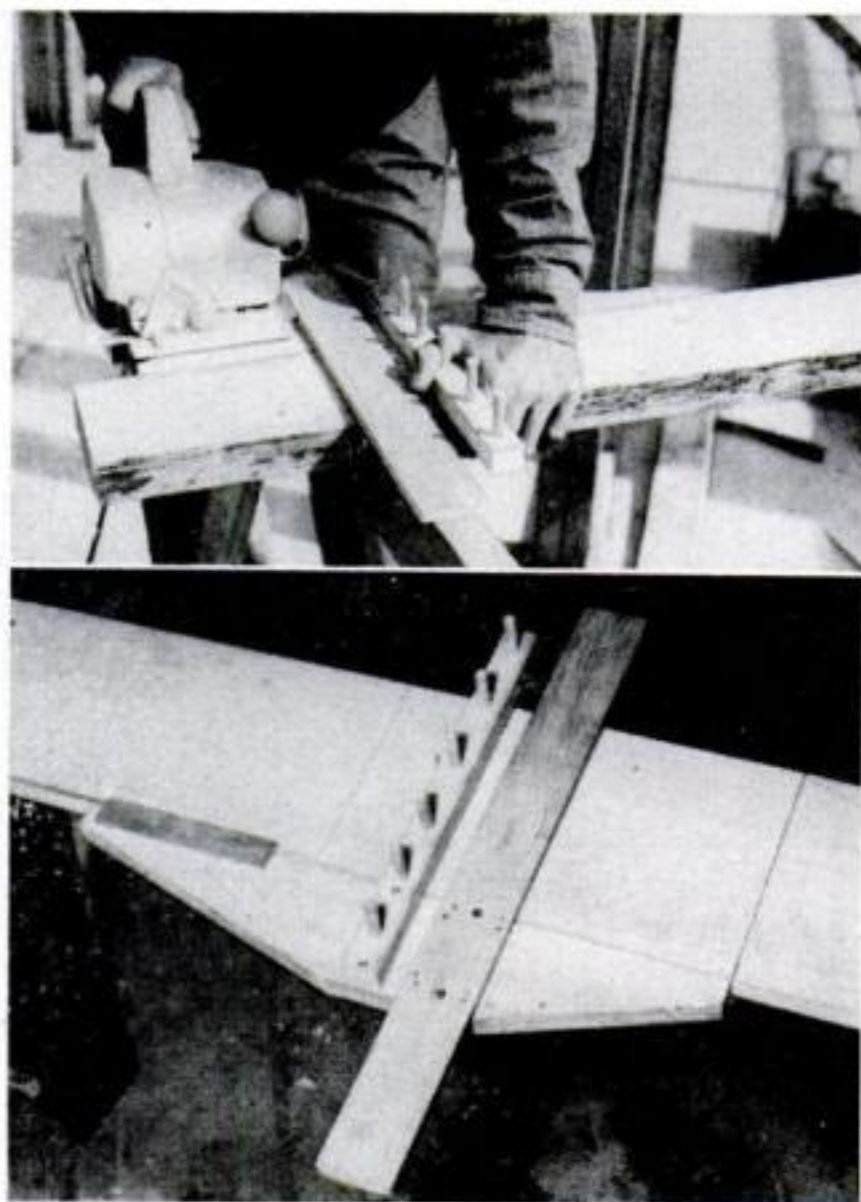
Jig for Portable Saw Squares Ends of Planks

SQUARING the ends of lumber up to 12" wide is a cinch if you use this jig to guide an electric handsaw. It amounts to a wooden T square, with the tongue made of stock thick enough to guide the edge of the saw. Short $\frac{3}{4}$ " dowels let you hook your left thumb around the jig to lock it against any width of plank during the cut.

If you make the end of the T-square head slightly long, the saw will cut it off on the first pass; then the edge becomes a cutting guide, to be lined up with the pencil mark on the work on all future cuts.—*Joseph Williams, Erie, Pa.*

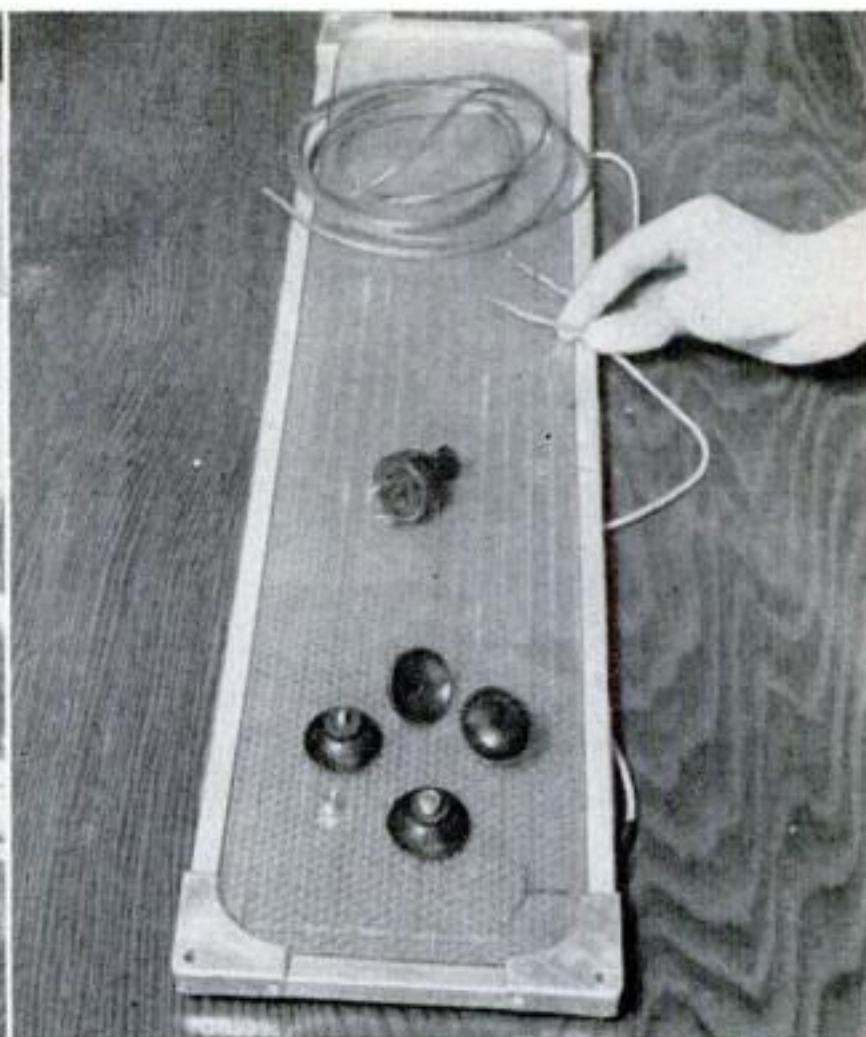
Emergency Trick Starts Motor

NOT wanting to tie up the motor of my grinder-polishing machine when the starting winding burned out, I used a piece of clothesline to start it like an outboard motor. With the rope wrapped around the shaft, I turned on the electric switch, gave a snappy yank, and off she went.—*Edward Mayover, Philadelphia.*

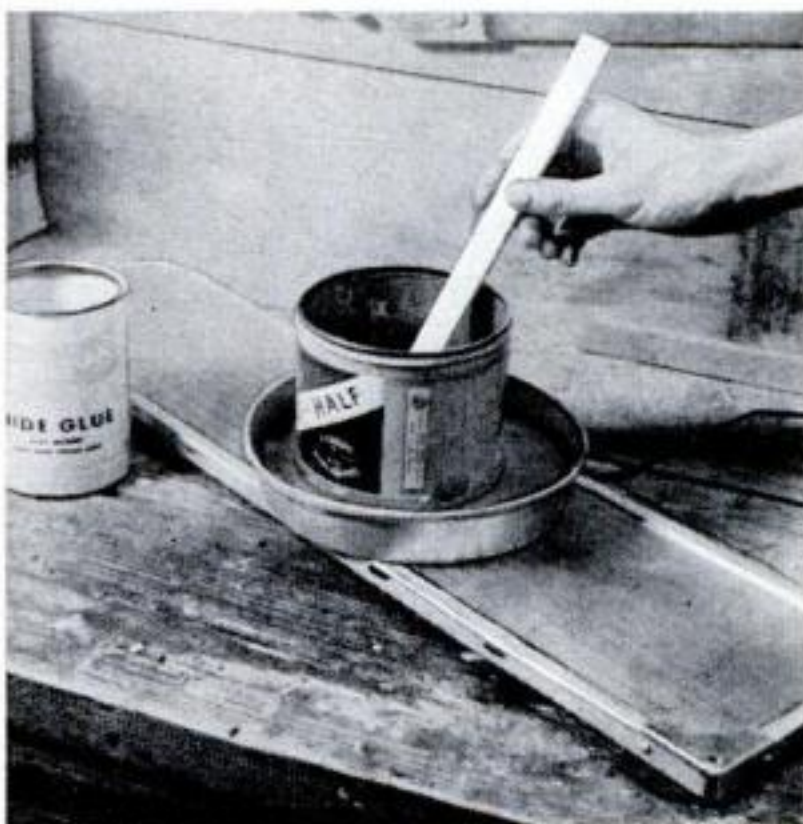




1 REMOVED from its wall-installation frame, the aluminum-backed glass grid shown here helps cook breakfast, fry eggs, toast bread and bring coffee to a boil. It's also a whiz at barbecues, and makes a perfect food warmer for the harried housewife.

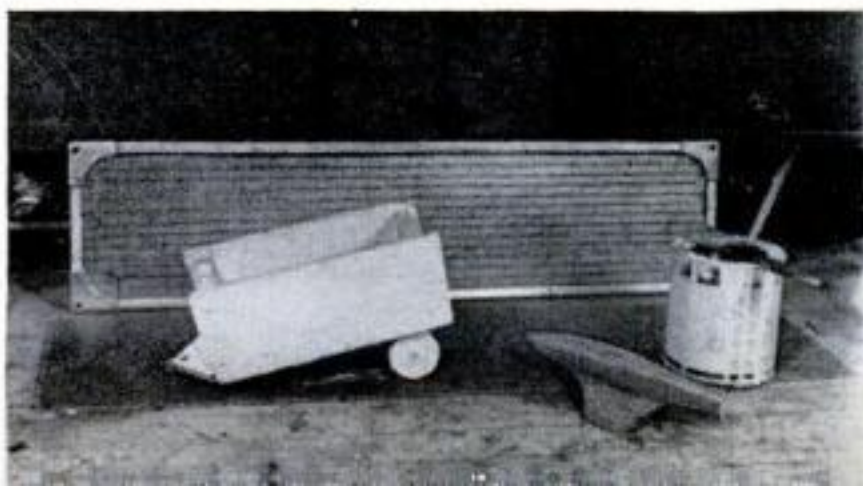


2 PARTS NEEDED to convert the heat panel into a portable tray are four suction cups, a length of lamp cord and a plug. The suction cups are attached to the aluminum reflector plate to serve as legs or fasten it to wall. Handles can be added to the ends.



3 APART FROM ITS KITCHEN DUTIES, the heating tray is a first-rate handy man. Glue-thinning is right down its glass alleys.

4 TILTED ON ITS SIDE, the tray does a fast job of paint-drying. And when the furnace is off, it helps soak up moisture in the cellar.

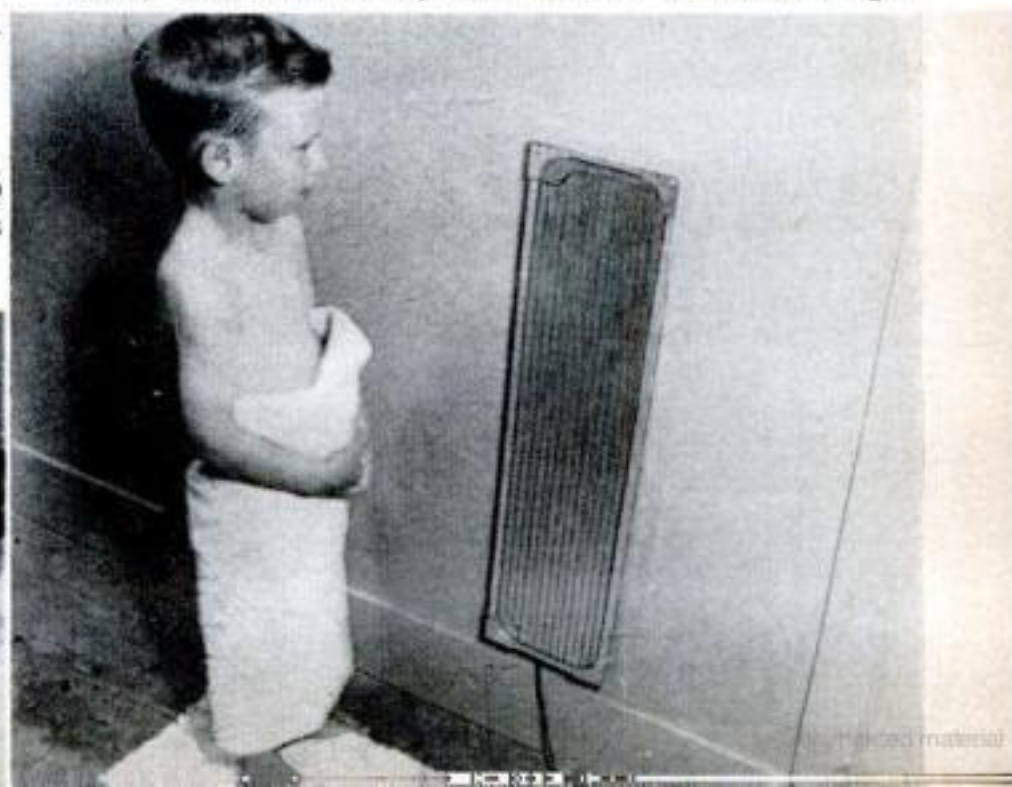


Radiant Heat Panel Is Jack-of-All-Trays

Designed as a wall heater, it can also fry eggs, warm baby's bottle, and handle shop jobs.

By Jerry Parker

5 BACK AT THE ROOM-WARMING JOB it was made for, the tray clings firmly to the wall, held there by its rubber suction cups.



You Can Turn Metal Into

Get next to a screw-cutting lathe to relax, gain a fresh

By Will Thomas

YOU'RE missing plenty, I'm convinced, if you don't own a metal-cutting lathe. That goes even if you are a doctor or lawyer, cop or cowman. Listen to this, which happens to come from a banker:

"For years I came home from work, sat down and read the paper, had dinner and then read some more. The sedentary life was beginning to get me. One day a friend suggested that I try doing something with my hands—maybe metalworking.

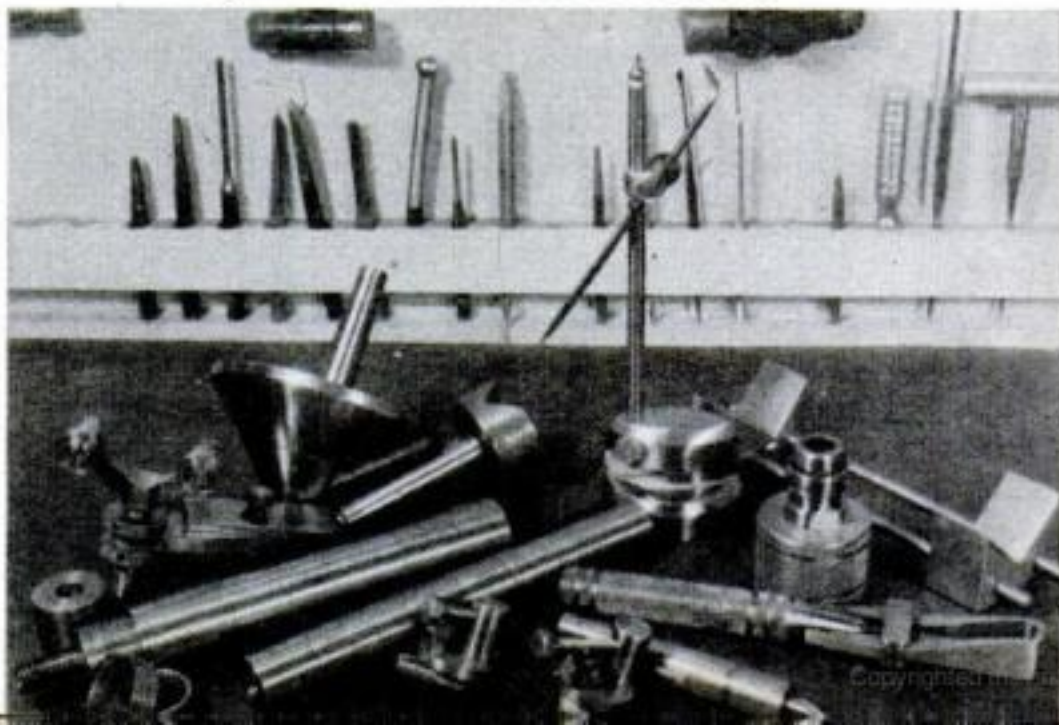
"Now I have a shop I am really proud of—most of it purchased with the money it earned. Since I've had a good-paying position for years, it has never been a question of *having* to get out in the shop and work. But there is still a real thrill in being able to turn out something that's worth cash.

"I well remember my first 'outside' job. It was at the beginning of the war and all equipment was scarce. One of the bank's customers, a man who ran a large machine shop, casually suggested I make a set of collets for him. With some misgivings I bought tool steel and set to work. I did the job on Sunday and delivered it on Monday. He paid me twice what I expected, as I did not then know what to charge.

"After that I made gauges, special aircraft and military parts, lens mounts and surgical instruments. At the completion of every job I was a wiser and much happier person. I don't do much 'outside' work these days, though I could still be busy every night and all weekend if I wished. But I still get never-failing pleasure in donning a pair of old trousers and going into the shop."

Paring steel. A metal-turning lathe is the king of all power tools. It is a precision instrument that will do some amazing things for you at the touch of a button or control wheel. You can peel a ribbon of

LATHE-MADE TOOLS will help stock your accessory shelf. Below are mandrels, a filing guide, ball-bearing pipe center, surface gauge and others you can turn out as needed.



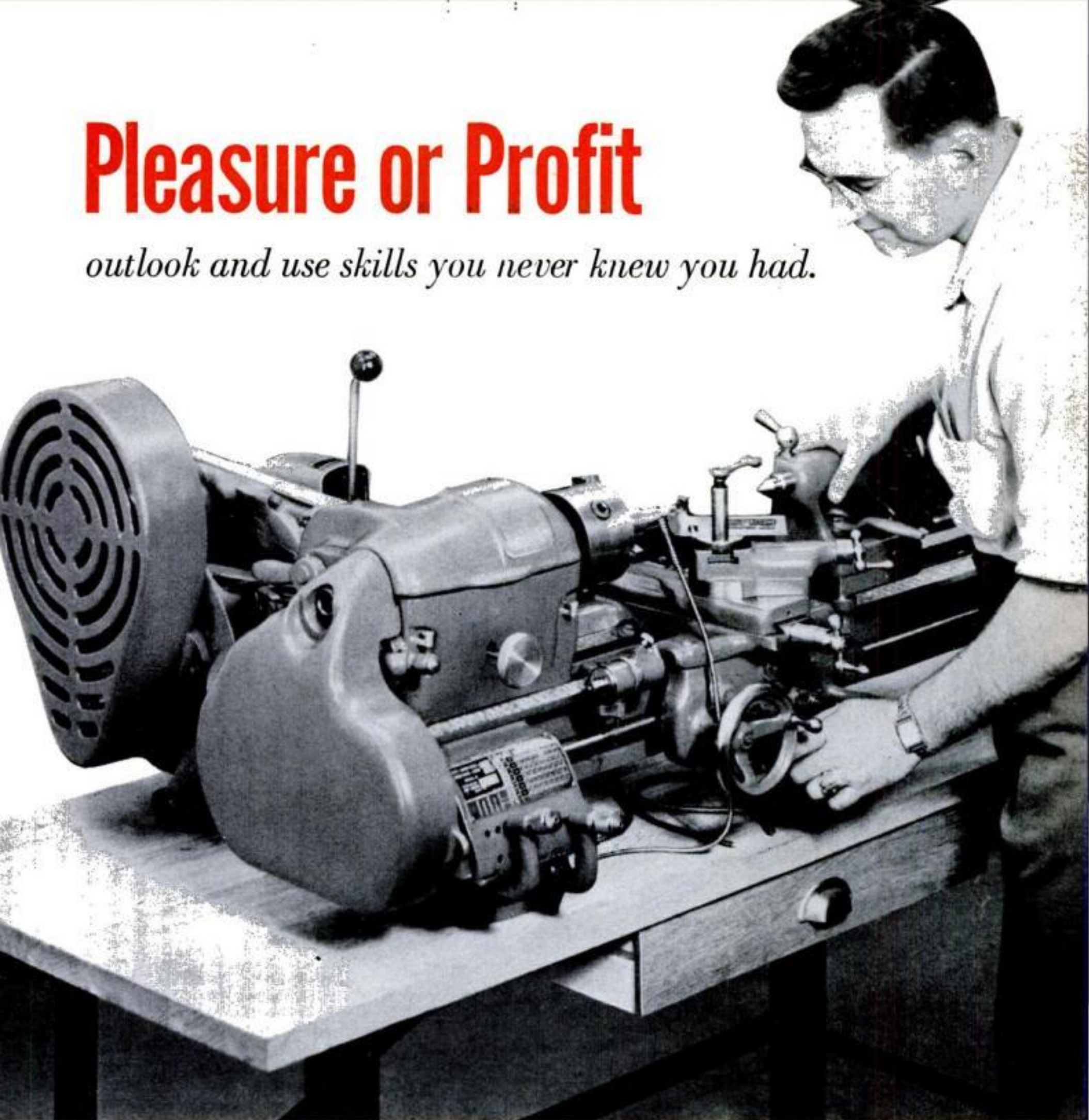
Says Who?

Will Thomas is an advertising manager by profession and a machinist by inclination. He began about 15 years ago. Today he has an elaborate shop, planned just for fun, though he does write articles about machine work. His shop includes a photo darkroom and a perpetually unfinished HO-gauge model railroad. Always glad to show others how machine tools work, he is proud that several of his "students" have graduated to shops of their own.

For another example of Thomas' work, see his wall-fastener article on page 213.

Pleasure or Profit

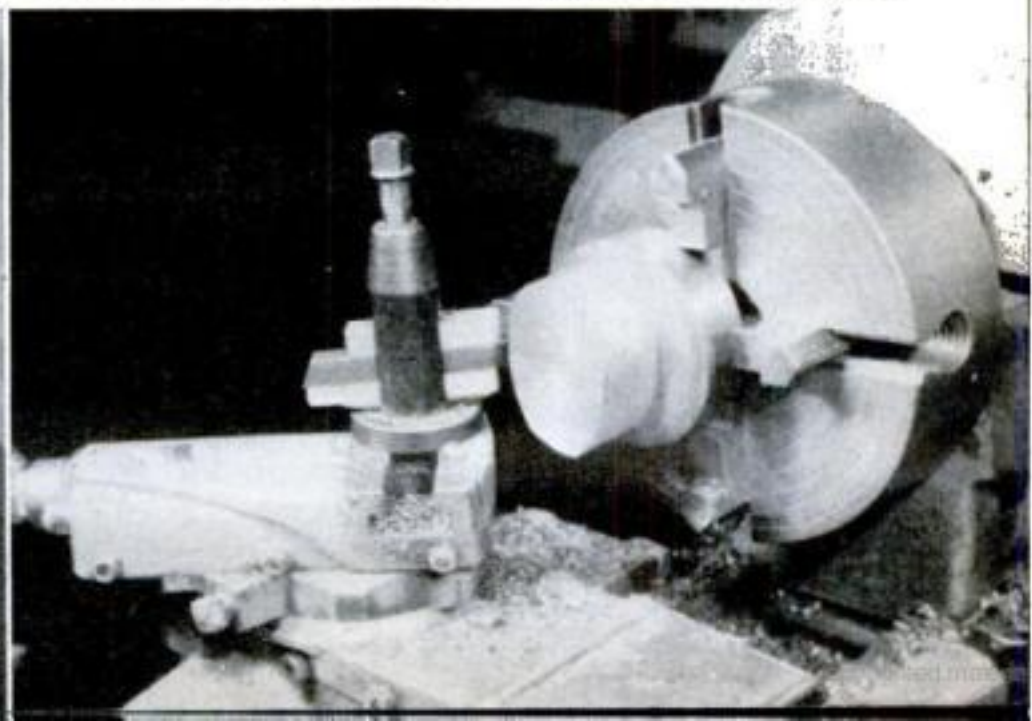
outlook and use skills you never knew you had.



MODEL ENGINES are favorite projects with many lathe owners. Here ring grooves are turned in a piston for a two-cylinder engine. The block and other piston are on the ways.



'TAIN'T ROUND. The lathe can turn out-of-round shapes when work is deftly off-centered. Here an elliptical cam, offset in the four-jaw, is turned one side at a time.



metal from a steel bar as easily as you pare an apple. You can cut threads so fine you need a magnifying glass to study their shape. You can work to a thousandth part of an inch—or split that thousandth still smaller if necessary.

Put a steel bar in the chuck, flip the switch, and look! you're cutting metal with metal. You are using the hard metal of a cutting bit to skim the softer steel of the work. If you want to tackle something harder, switch to a carbide-tipped tool. With it you can shape most anything this side of a diamond, including hardened alloy steel or marble.

With your lathe you can build a working steam locomotive or rebuild that faucet on the kitchen sink. You can make a brass lamp, a set of stainless-steel chessmen, or an experimental engine that you've dreamed up yourself. What's better, you can have a whale of a lot of fun at it.

What is a lathe?

Basically, it is a machine that rotates work against a fixed cutter. If you already have a woodworking lathe, you can turn soft metals on it by adding a slide rest. This is a mechanical tool holder, controlled by two screws, which holds the cutter rigidly and moves it along or crosswise to the bed. It won't cut threads or handle large jobs, but with care you can make simple machine parts and models, particularly from dural, brass and plastics.

Once you've sampled metal-turning, you will almost certainly want a back-gear, screw-cutting lathe. This is the job that turns metal with power and precision. It's called back-gear because the headstock houses gears that will give you the slow, powerful speeds needed for some jobs. One common workshop lathe lets you run the spindle at 16 different speeds ranging from 28 to 2,072 r.p.m.

It's called screw-cutting because the cutter can be power-driven along or across the

ways at exactly predetermined rates. This means that a sharp-pointed tool will cut screw threads. By changing the gear train on most lathes, you can produce threads from 4 to 160 per inch—including U.S., British, metric (and probably Martian) threads, inside or outside, straight or tapered.

Don't get the idea that a lathe is useful only for producing round shapes on round workpieces. That's a common misconception. A lathe is an excellent machine for producing smooth, accurately flat surfaces, if necessary at precise angular relationship

to other parts. With common setups and attachments, a lathe will make slots, grooves, cams and even gears.

Fun with a lathe.

It is pleasant to run your lathe just for the heck of it. Try all the things a lathe can do, and operate it if and when the spirit moves you. You'll be surprised how often the spirit does so.

It will be a big help in maintaining your home and car. You can make parts for appliances, trick plumbing rigs, special brackets and fittings. (Warning: watch out for neighbors here. Once you make a special part that keeps Next Door's washing machine running, the path to your shop door will be worn smooth.)

Don't forget that a lathe is the greatest tool-making machine in the world. You'll use it to make many of its own accessories—such as mandrels, arbors and collets. While you are at it, turn out some special hammers, punches, clamps, vises and the like. It is permissible to show these shiny tools to an admiring friend and say nonchalantly, "Made them myself in a few evenings."

You can sharpen tools precisely on a lathe, too, since the slide and feed screws give hairline control. For a serious model-maker, a lathe is almost a necessity. If you like engines, there's a wonderful array of working miniature steam, gasoline and

[Continued on page 244]



Handling the Wife...

Your helpmeet may not at once take kindly to your spending time at the lathe. Promptly making domestic repairs, and pointing out how the lathe helps, is a wise dodge. A few domestic projects—a lamp, ornamental door knocker or candlesticks—may soon have her telling friends, "George made this himself." Such domestic-relations jobs may save you the fur coat needed to treat stubborn cases.

KEEPING THE

Home

SHIPSHAPE



A sluggish scale may step up its spring action if weighted with a square of wood weighing about a pound. Screw the wood in place at the corners so it can't shift, then adjust the scale's setscrew back to zero.

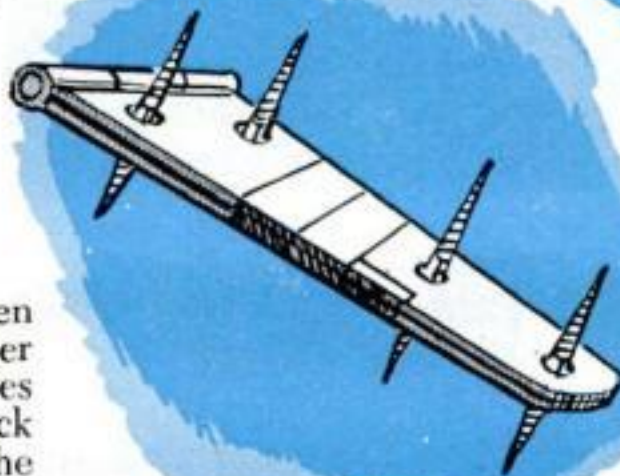


For quick thawing, steam frozen meat in a covered colander set over boiling water. In minutes the pieces can be pulled apart—a good trick when unexpected guests arrive or the cook makes a late start on dinner.



Hamper hooks make it easier to fill a limp laundry bag. Cut from aluminum or brass, they're attached with screws and washers to fold back when not in use. Tape loops on the laundry bag are spaced to match.

Groaning pipes that set up a racket when taps are turned on can often be silenced if you take the sag out of them. Strap them up with additional pipe supports on the overhead joists in the basement.



Screws that fit are always right there for re-use when you store a hinge with the fasteners attached. Fold the hinge flat with the screws inserted head to head; then wrap tightly with tape or rubber bands.

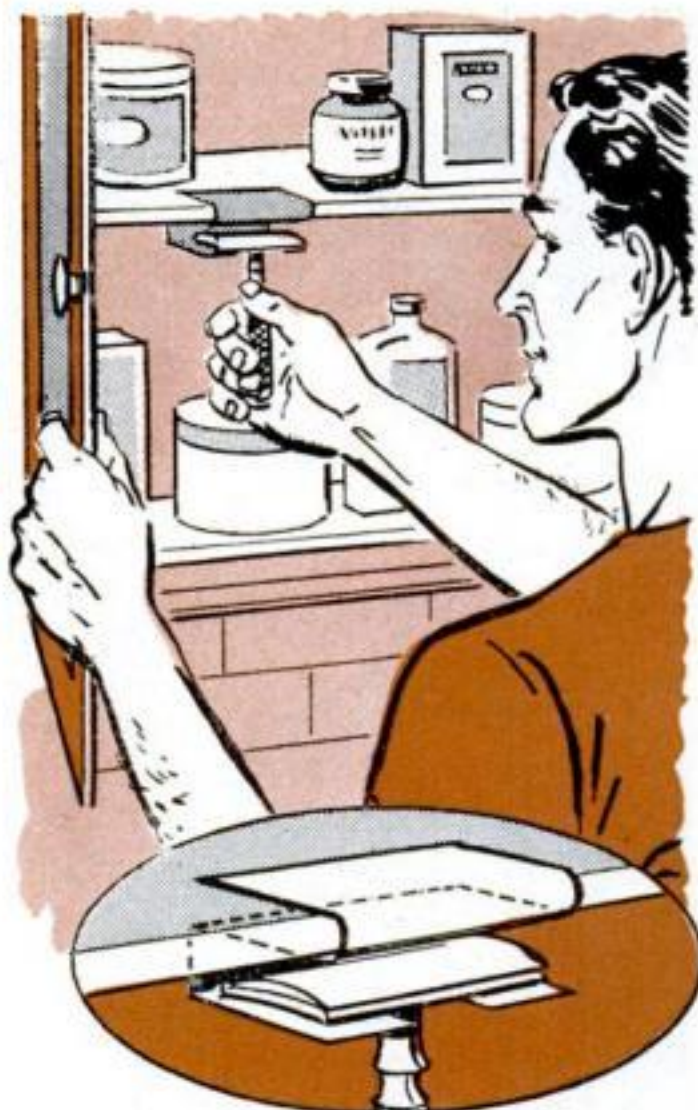
Please turn the page for more home tips.

JANUARY 1954 225

More Home Tips



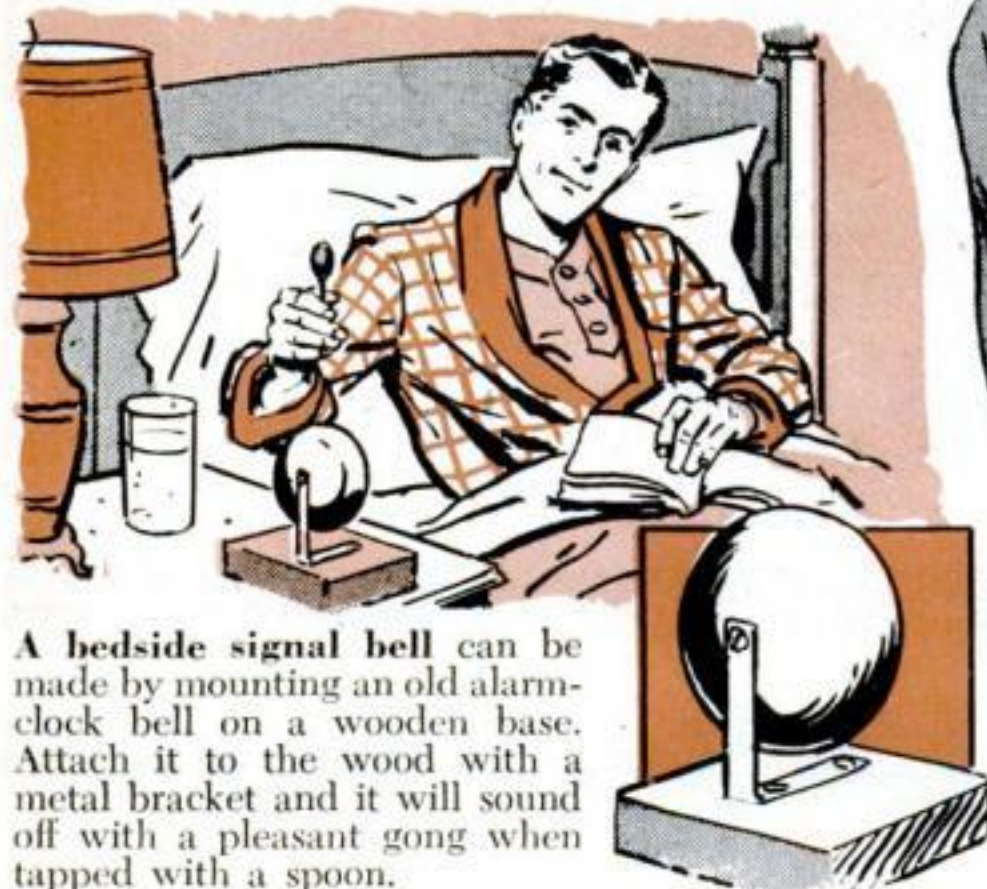
Kitchen file drawer keeps small items handy: cans, cartons or bottles that get lost on your pantry shelf. Cut wooden sidepieces to fit the drawer. Groove them for sloping dividers made of thin wood or composition board.



Razor rack for the medicine cabinet is a strip of brass or aluminum bent to fit over a shelf. A U slot large enough to admit the razor handle is cut at one end and sharp edges are dulled with a file.



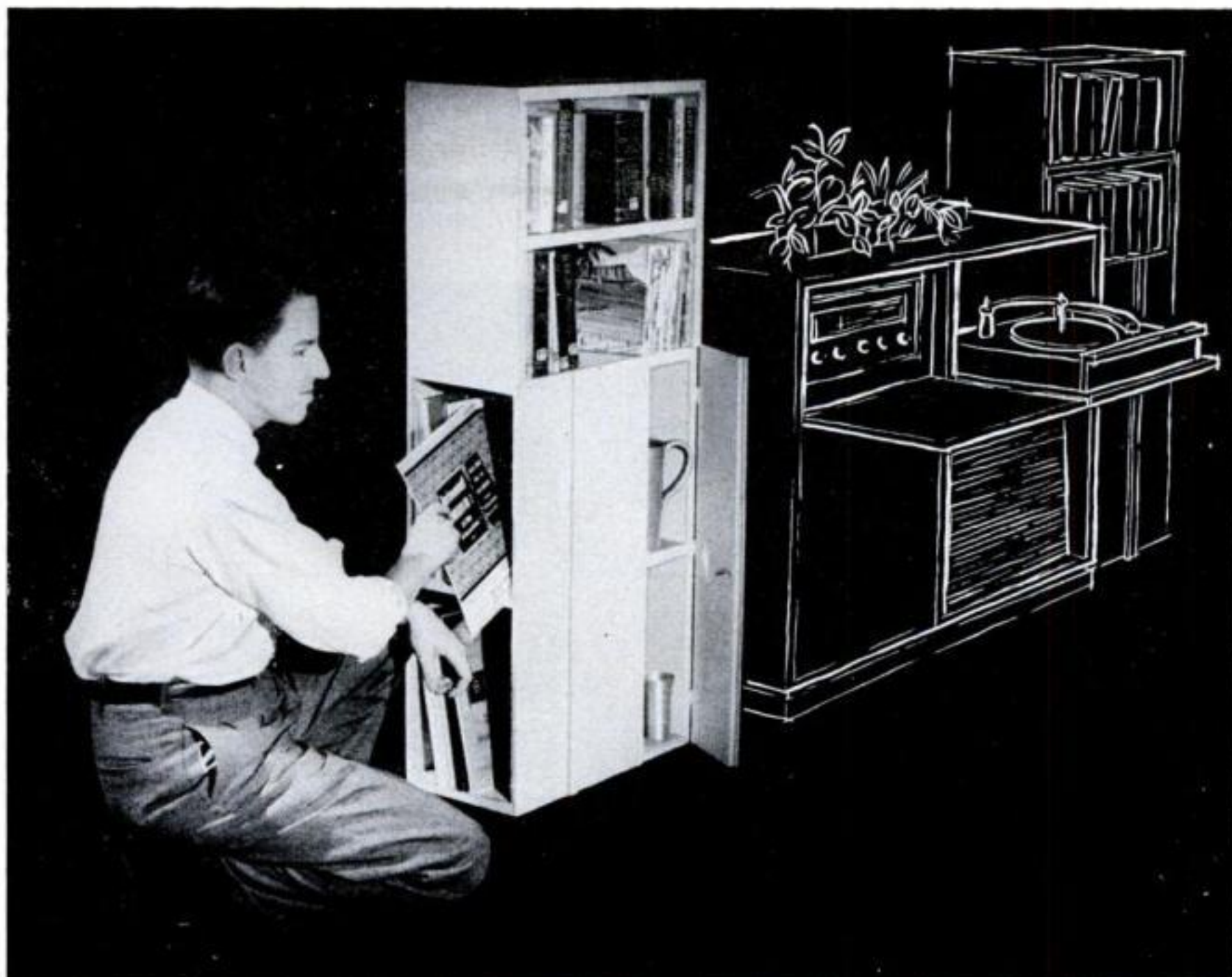
Cracks in inlaid linoleum can be sealed with a paste made from matching linoleum scrapings mixed with clear, waterproof cement. Allow the patch to dry completely before walking on it.



A **bedside signal bell** can be made by mounting an old alarm-clock bell on a wooden base. Attach it to the wood with a metal bracket and it will sound off with a pleasant gong when tapped with a spoon.



A **bushel of small toys** can be stored in a bushel basket. A circle of plywood, cut and hinged, makes a cover. Fasten it to the rim of the basket with tiny angle brackets. A brightly painted trim will appeal to the small fry.



Singly or in pairs, these cabinets provide three kinds of storage in very little floor space.

How to Store Your Records in Bookshelf Space

Easy to build, this wall-hugging cabinet holds your albums sideways, leaving room for reading matter and a cupboard.

By Robert Gorman

THEY say long-playing records save a lot of space, but they did nothing to shrink my old record cabinet. Although thinner, LP albums are just as high and deep as old-fashioned platter packets. So it first seemed that new cabinets would have to be as big as the old.

But the ones I built take advantage of the slimness of the new albums. These

cabinets store full-size disks in half the usual space—parallel to the wall instead of at right angles. This leaves space for tall articles like pitchers or big reference books.

My cabinet occupies otherwise useless space in a vestibule between two doors. But similar units can be used in numerous ways. They need only be accessible from one end and one side. In building a pair, don't forget that most arrangements will call for one right- and one left-hand unit

my two-stacker, in which the two cabinets are identical, is the exception.

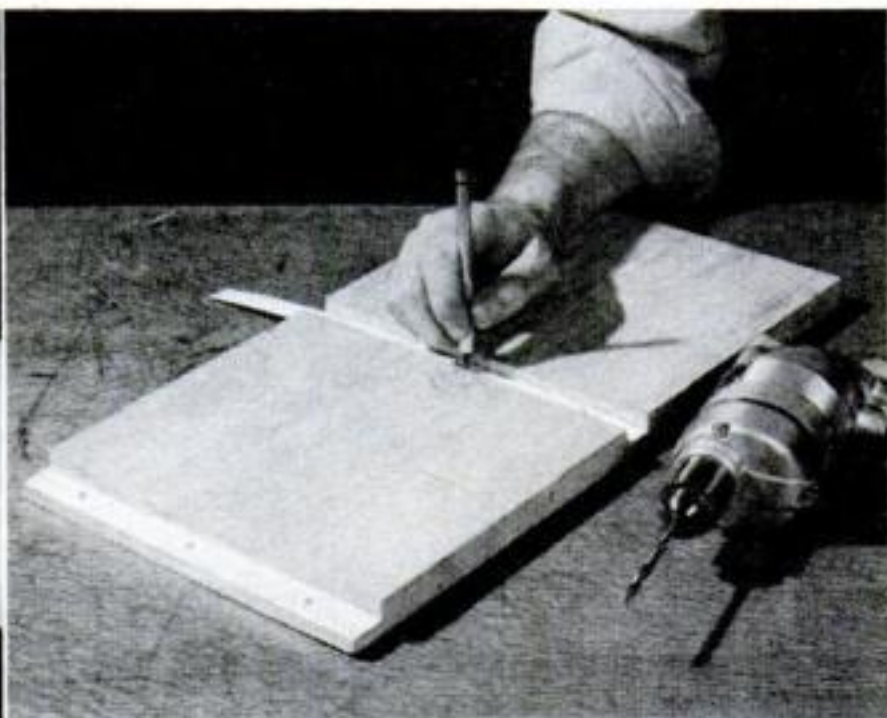
To fit my wall space, the cabinets were built to a width of 20", and all dimensions shown are based on this. Of course, units can be made wider or narrower to suit your needs. The minimum width of the

record space (parallel to the wall, or as measured from the open side) is 14"; any extra width can be used for the cupboard.

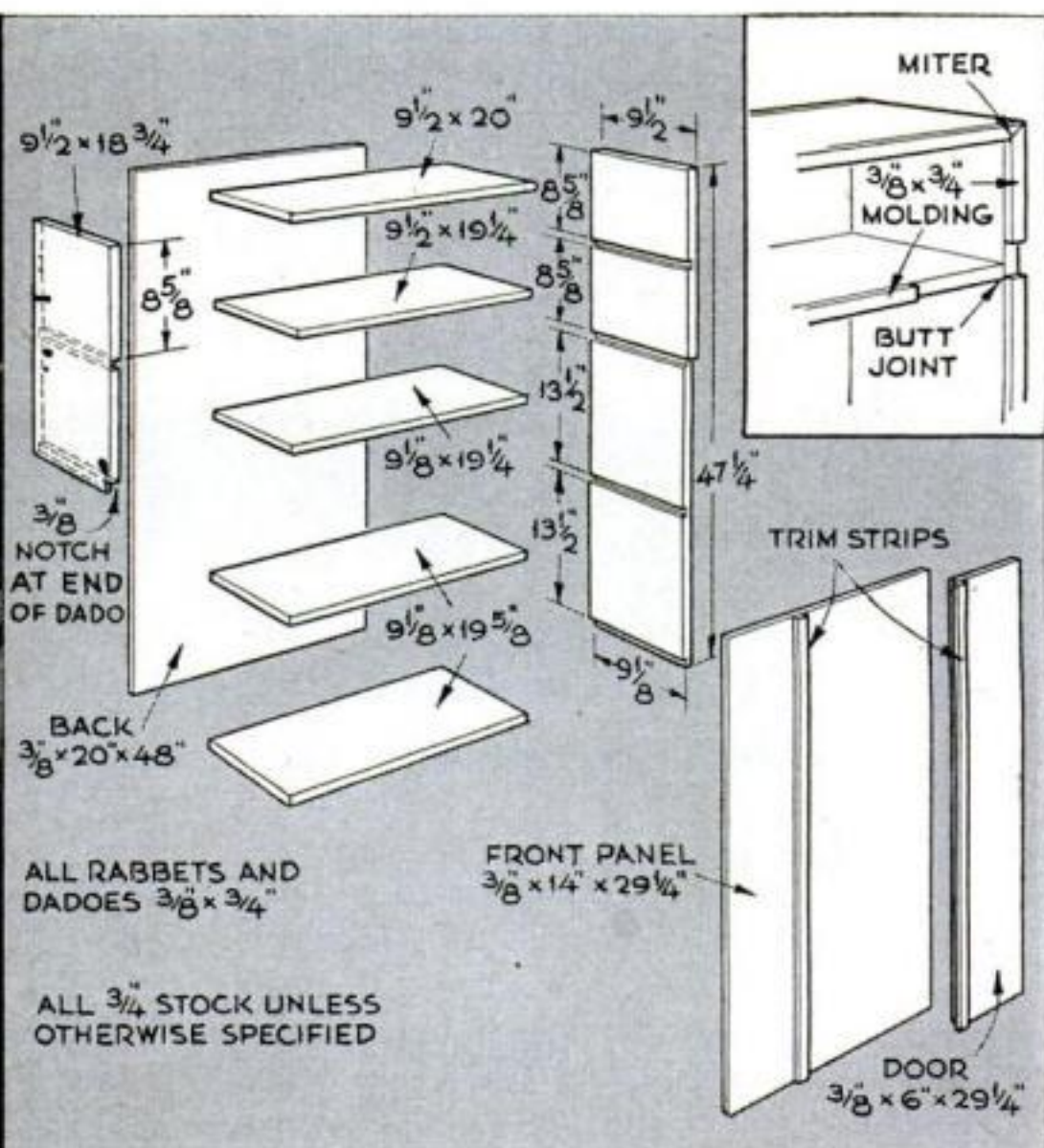
The cabinet can be a hammer-and-saw affair, with glued and screwed butt joints, or a circular-saw job with rabbeted and dadoed joints. Sides and shelves are cut



WIDE BOARDS may have warped enough to be hard to push into the dados. Fit can be eased by paring tiny chamfers along the shelf ends with a chisel as above. Pressed home, warped shelves will be flattened by the dados.



MARK OFF screw holes with a cardboard template laid in the dados. Then drill clearance size for screws from inside. For butt joints, mark centerline and spot the holes along it. Countersink holes from outside.



APPLY GLUE to joints and assemble with 1 1/2"-10 wood screws. To align butt joints, clamp or tack strips inside, 3/8" from centerlines. Mount the back also before joints set. Attach front temporarily with two screws.

THESE SIZES make a 20"-wide cabinet. For simpler butt-joint construction (inset above) cut second and third shelves 18 1/2", fourth and bottom 19 1/4" long. Molding brings bookshelf section flush with panel below.

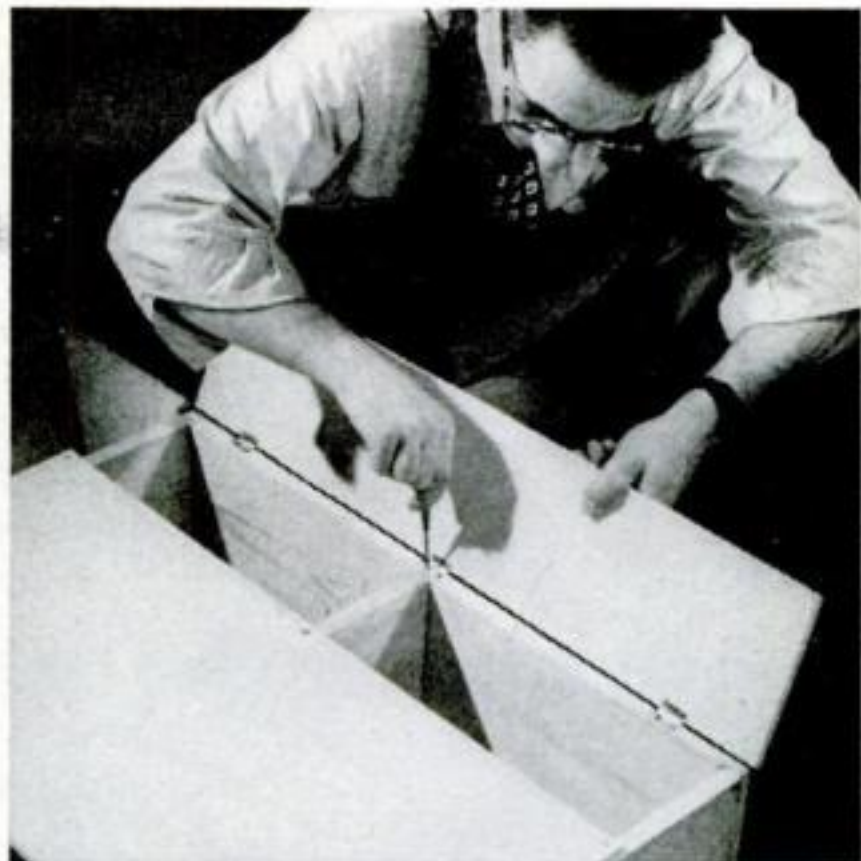


TALL AND TRIM, these two stacked units make good use of odd space between doors, are easier to build than a single high one.

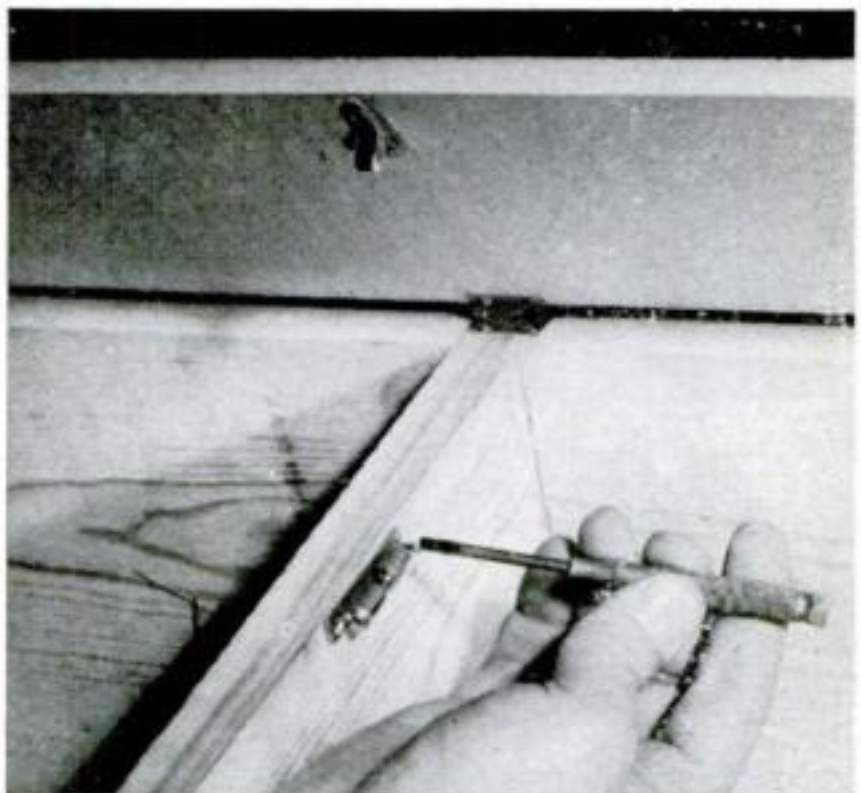
from one-by-10 lumber (which measures $\frac{3}{4}$ " by $9\frac{1}{2}$ " as it comes from the yard). Front and back are $\frac{3}{4}$ " plywood, the dimensions shown taking advantage of the standard 48" panel size.

My bookshelves are spaced only $8\frac{3}{4}$ " apart, which is on the skimpy side for tall volumes. You can boost this a bit by stealing $\frac{1}{2}$ " from each record compartment; a height of 13" is ample for these, and will maintain the over-all height at 48".

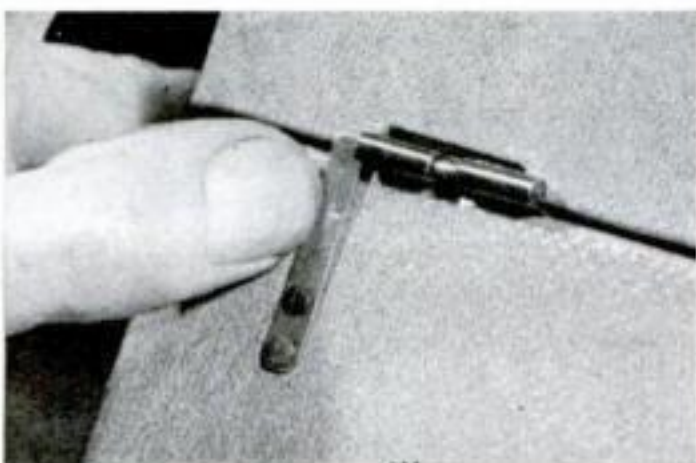
After assembling the cabinets with glue and countersunk screws, I covered the screw heads with plastic composition wood. The wood was sealed with thin shellac, followed by an undercoat and an enamel finish.



DOOR for closed section is cut from same 20"-wide piece as front panel. Chisel three gains (shallow notches) in cabinet side to full thickness of $\frac{1}{2}$ "-by-1" butt hinges. Screw hinges to inside of door without recessing. If gains are correct depth, door will close flush. Trim strip conceals door gap.



FRICTION CATCH goes under third shelf. If front panel is mounted only temporarily at first, it can be removed after joints set for installation of catch (above, cabinet is laid flat). Remount panel with glue and screws.



Spring Strip Locks Come-Apart Hinges

COSTLY damage can result if separable hinges like those on typewriter cases and portable radios come apart at the wrong time. A springy metal strip, attached with two screws to either case or lid, prevents accidental separation. Mount it to project past the hinge member attached to the other section. To slip the hinge, either press down or pull out the strip until it clears.—Walter E. Burton, Akron.

Here's a family project that's good for a lifetime

Developing—Printing—Enlarging! Here's much more than just another hobby for dad, or a pastime for junior. Here is a project for the whole family. A project whose rewards in pictures are good for a lifetime. You don't even need a darkroom for developing and printing. And enlarging will be one of the most satisfying activities you've ever tried. Here is some moderately priced Kodak equipment. Your Kodak dealer will be glad to show you more. He has all the latest dope and "doings" for beginners and experts.



A complete enlarger for only \$57.50. Kodak Hobbyist Enlarger comes complete with *f*/6.3 lens. "Cold" light protects negatives. New-design lamp house insures sparkling enlargements up to 7 times. Easy-load, rotary, glassless negative carrier. Easel extra.



Makes superb salon-quality prints. Kodak Fluorolite Enlarger has integrating-sphere light source for even illumination plus unusual printing speed and contrast. Focuses and elevates simultaneously. Lighttight paper-storage base. \$99.50, without lens and easel.



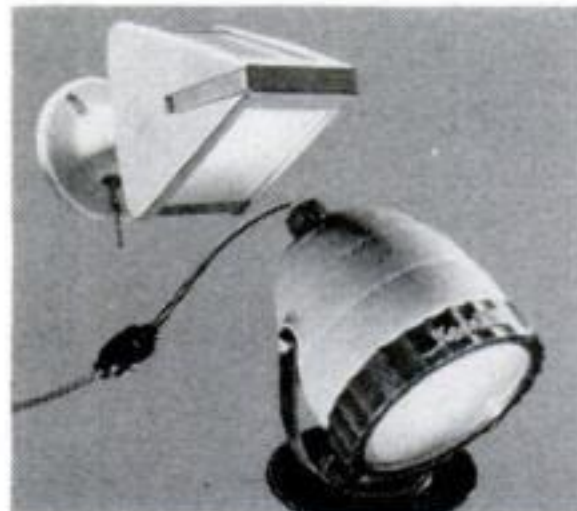
Everything you need for \$9.75. Kodacraft Photo-Lab Outfit contains basic essentials for developing and printing pictures. Includes rocker-type trays, roll-film tank, printing frame, printing paper, thermometer. Comes complete with illustrated instructions.



Times your work. Kodak Timer covers all intervals up to 60 minutes. Spring-wound; has both minute and second hands. Can be stopped and restarted without re-setting hands. Special feature: handy tilting base. \$7.95.



Washes film or prints automatically. Kodak Automatic Tray Siphon converts an ordinary tray into effective washer. Attaches to water tap. Water is siphoned out at same speed it enters. Wonderful for kitchen or bathroom. \$4.50.



Protect light-sensitive materials. Kodak 2-Way Safelight (left) swivels on socket for direct or indirect lighting. Second filter (extra) allows 2-way light. \$4.50. Kodak Adjustable Safelight Lamp (right) attaches almost anywhere. \$8.75.

Prices include Federal Tax where applicable and are subject to change without notice



Accurate weight scale. Kodak Chemical Scale weighs up to $3\frac{3}{4}$ ounces or 175 grains (avoirdupois), or 130 grams (metric). Chemical-resistant housing. Hair-lined window makes easy reading. \$14.50.



Dries prints without curling. Kodak Blotter Roll with corrugated backing allows free circulation of air for rapid drying. Capacity, 80 prints of average size. 6 feet long, $11\frac{1}{2}$ inches wide. \$2.88.



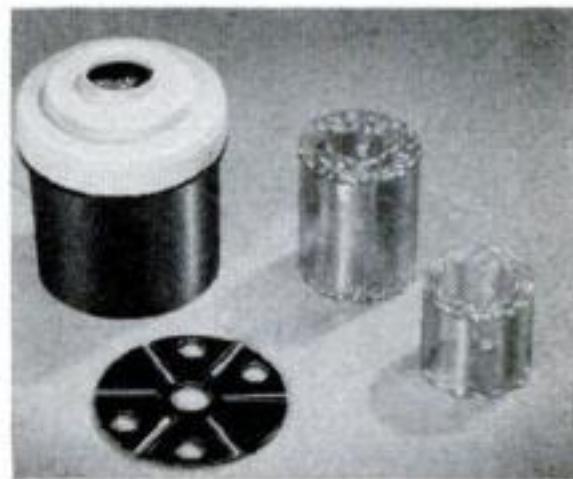
For contact printing. Kodacraft Printing Frame includes glass plate, mask for 9 popular negative sizes. Accepts paper up to $4\frac{1}{4} \times 5\frac{1}{2}$ inches. Corner loading assures accurate positioning. \$1.65.



Zips off the water. Kodak Rubber Squeegee quickly removes superfluous water from flat surfaces. Ideal for quality ferrotyping, or Kodak Dye Transfer Process. 10-inch blade. \$3.75.



3-in-1 funnel. Kodak Combination Funnel is made in two plastic sections. Can be used 3 ways as illustrated. Largest intake diameter, 5 inches. 2-inch and $\frac{1}{2}$ -inch spouts. \$.85.



Easy roll-film developing. Kodacraft Roll-Film Tank can be used in lighted rooms (after loading). Faster drying "apron" method allows immediate development of successive rolls. \$2.53.

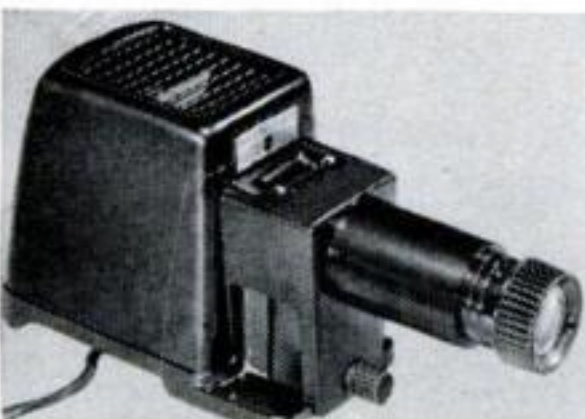


Another good friend of the family— KODACHROME SLIDES

For an evening of thrills, you can't beat beautiful Kodachrome slides in glorious full color. Show them with one of the fine-quality Kodaslide projectors or viewers described below. Their optical systems help project your slides sharper and brighter, making every colorful detail stand out.



Inexpensive fan-cooled projector. Kodaslide Highlux III Projector. 300 watts. Brilliant optical system. Built in its case. \$56.50. Highlux II (no fan) is only \$36.50.



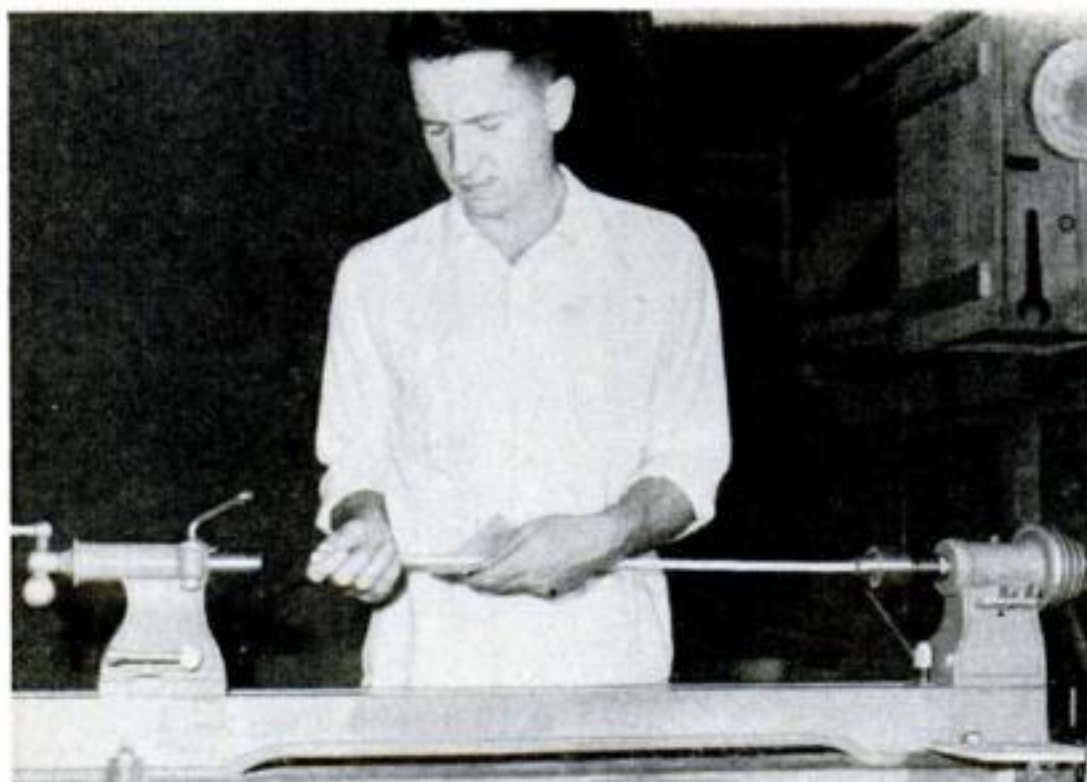
Rock-bottom price. Kodaslide Merit Projector features slide-feeding in top, prevents jarring. 5-inch $f/3.5$ lens. 150-watt lamp. 10-foot cord. \$26.10.



Show slides in lighted rooms. Kodaslide Table Viewer 4X combines screen and projector in one convenient unit. It enlarges color slides 4 times. \$37.50.

Your Kodak dealer will be glad to demonstrate this equipment for you. Make him headquarters for all your photo needs.

Eastman Kodak Company, Rochester 4, N. Y.



1 SAND DOWEL ROD TO SIZE. Spin it slowly—one end chucked, other end held loosely in hand—against sandpaper. Portable drill in bench vise will substitute for lathe. Check diameter often by putting rod in test hole.



2 CUT GLUE SLOT by driving rod through jig with a dowel-sized hole into which point of screw projects from side.

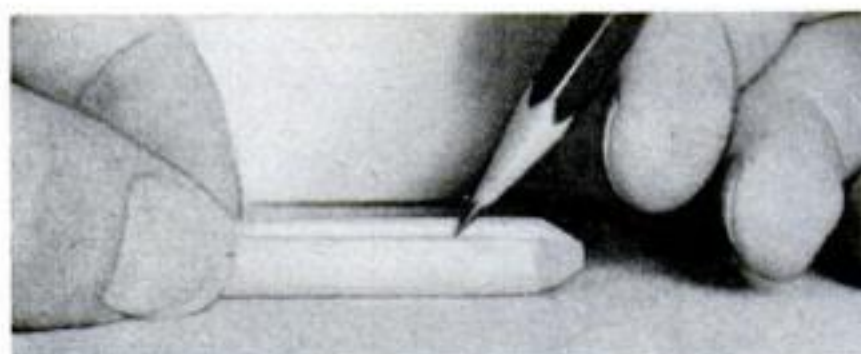
How to Make Dowel Pins

DOWEL pins are an old, old fastening for wood joints—and still one of the best. They are simple, adaptable and very strong. Craftsmen prefer them particularly for joining boards for a table top, reinforcing miter joints and attaching aprons to tables. You can buy dowel pins ready-made, but it's easy to make your own exactly the size you need.

Dowel rods—you can buy them at most hardware stores and lumberyards—are the raw material. Select a diameter roughly half the thickness of the stock to be joined and make the pins six times longer than their diameters. A close fit makes a better joint. The receiving holes should be about $\frac{1}{8}$ " deeper than the length of the pins to allow a space for surplus glue.—*Leo F. Bowler Jr., San Bernardino, Calif.*

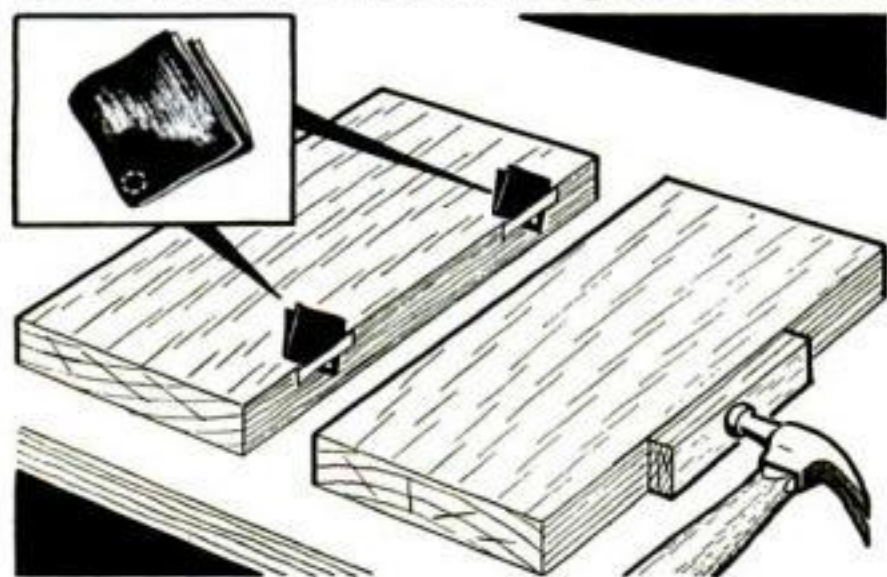


3 CHAMFER THE ENDS for easier insertion after pins have been cut to proper length. A power sander does a fast job but it can also be done easily by hand with a rasp.



4 FINISHED DOWEL PIN looks like this. Full-length glue slot allows air to escape when joint is assembled. Pin should fit snugly, yet slide in without excessive pressure.

BB Shot in Carbon Paper Locates Points for Dowels

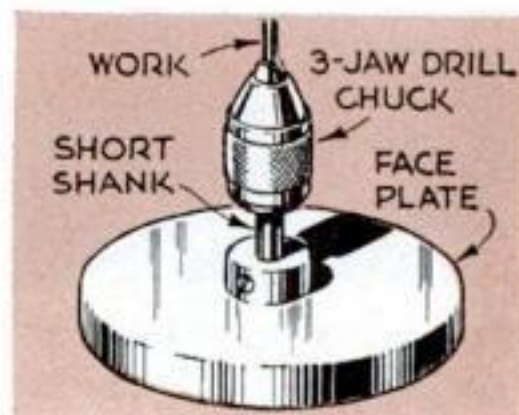


POINTS for drilling dowel holes to mate pieces of wood can be marked quickly and accurately by folding a sheet of carbon paper, carbon side out, and dropping in a small ball bearing or BB shot. Line up the pieces to be doweled, slip the paper between them and tap them together with a hammer. The carbon will mark both pieces at points exactly opposite each other for drilling the matching holes.—*Mrs. John B. Higgins, Seattle.*

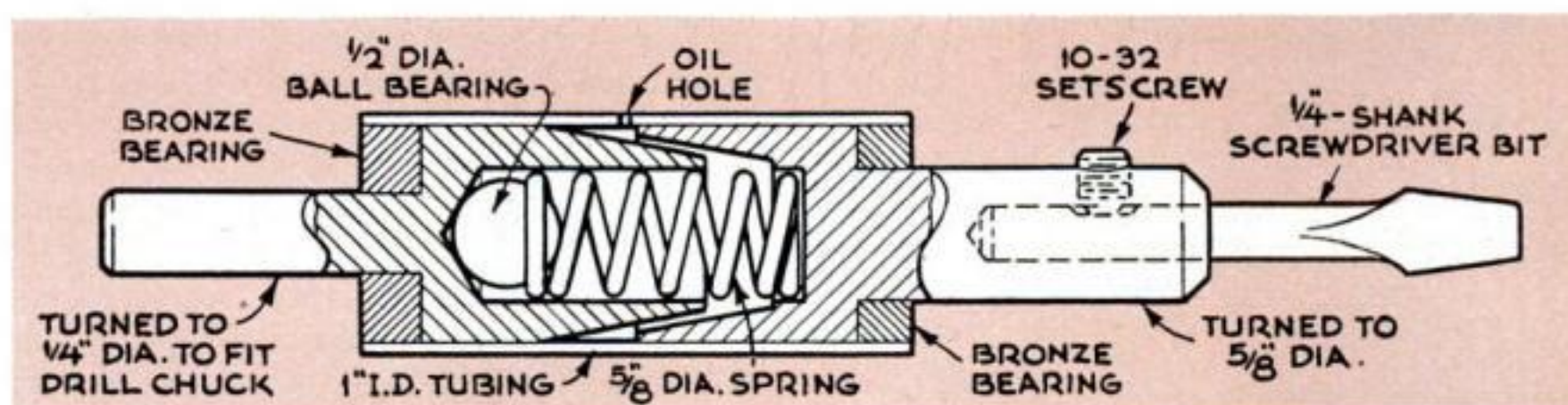


Surface Gauge Holds Magnifier. You can do delicate work with both hands if you mount a magnifying glass on a thin rod of the same diameter as the scribe of your surface gauge. The rod can then be held in the surface-gauge clamp and the glass adjusted to any height or degree of tilt. The base of the gauge provides a solid support for the magnifier. When not in use, the glass can be kept dust-free in a box cut from a covered tin can.

NEW Shop Ideas



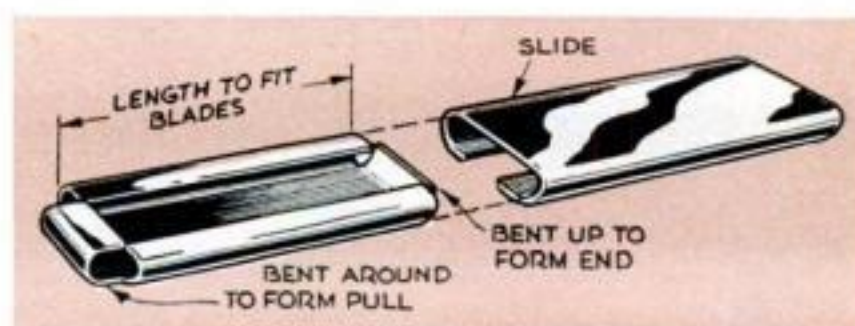
Chuck Doubles as Vise. Small work, rod or hexagon stock can be held vertically in a vise assembled from a drill chuck and lathe faceplate. The faceplate provides a broad, flat base for the chuck which is fitted to it by a short length of threaded rod.—Howard E. Moody, Upper Jay, N. Y.



Drill Attachment Drives Screws. Your electric drill will drive screws with this friction attachment. Mating tapers housed in aluminum tubing are held apart by a compression spring. Light pressure forces the rotating taper held in the drill chuck against the stationary taper that holds the screwdriver bit. A friction-clutch action results,

driving the screw home. Slipping the tapers under light pressure drives the screw as slowly as desired. Turn the tapered parts from 1" cold-rolled rod, setting the lathe compound at 5°. Then slide the parts complete with spring and ball into the tubing and press the bronze bearings into the tubing ends.—M. Wittner, Brooklyn, N. Y.

Curtain Rod Makes Small Drawers. Short lengths of telescoping curtain rod make handy under-the-bench drawers for jigsaw blades, lathe bits or drills. Tack the outer part of the rod to the underside of the bench to serve as a slide. Bend up the ends of the inner part to form the drawer.



Please turn the page for more shop ideas.

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MORE SHOP TIPS



Cover Protects Motor. A sheet-metal box will keep dust and metal chips out of the vent holes in a power-tool motor, prolonging its life. Attach the box to the motor stand or other convenient stationary part and cut an oversize hole for the pulley shaft.—*Floyd McGuckin, Ridgewood, N. J.*

Grinder Smooths Countersinks. Seldom does a smooth finish result from a countersink bit. This grinder tool, with its easily replaceable, emery-cloth working edge, will remove the chatter marks and leave a polished edge on the countersunk hole.

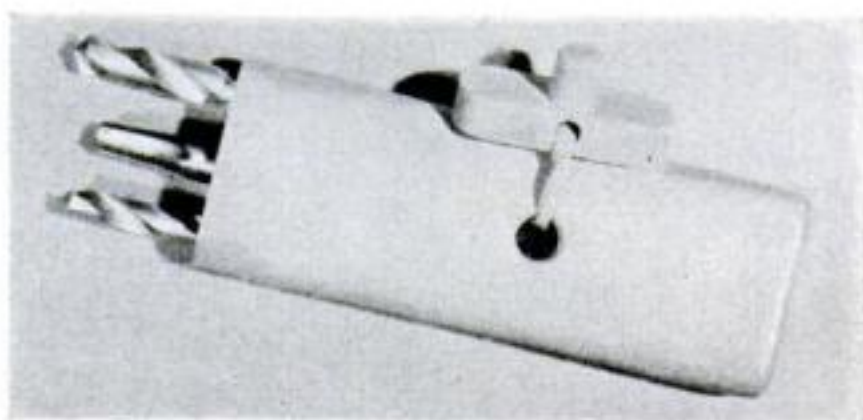
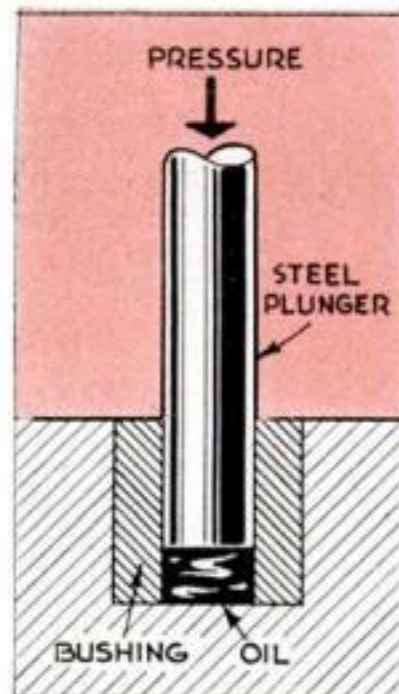


Turn the tool from a short scrap of cold-rolled or drill rod and cut a slot across the bottom. The diameter and angle should be turned to the same shape as the countersink. Turn the shank to $\frac{1}{2}$ " diameter. Cut half circles of emery cloth and wedge in the slot.—*Gus W. Hall, Brooklyn, N. Y.*

Oil Forces Bushings Out of Blind Holes.

Hydraulic pressure can pinch-hit for pry bars, cold chisels, punches or other tools usually needed to remove a worn bushing from a blind hole.

Fill the bearing hole about one-third full with a heavy oil or light grease and drive in a steel plunger, turned to a minus one or two-thousandths fit. Hammer blows will force the oil under the bushing and lift it out. Stubborn bushings may require the pressure of an arbor press, but the result is the same—something must give and it must be the bushing.—*F. Strasser, Santiago, Chile.*

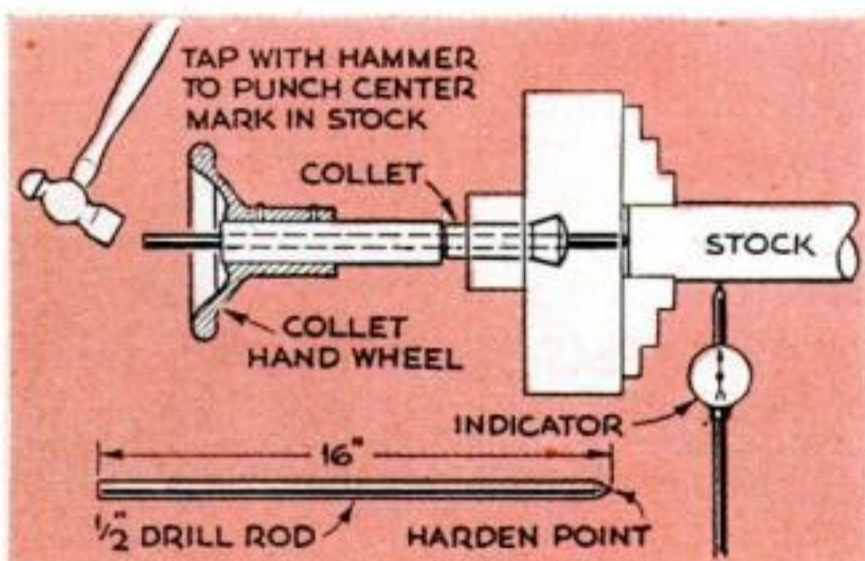


Taps and Drills Packed in Sets. Keep your taps and matching drills together in handy individual cases to save looking up the sizes needed for drilling and tapping holes.

Make the cases from blocks of wood—pine will do. Drill three holes for the tap and drills, then drill through the side for the rubber band that holds the cap tightly in place. Glue a dowel into the cap to fit the center hole. Drills can be taken out by turning the cover.—*John M. Avery, Dexter, N. Y.*

Centerpunching Long Stock. Shafts or lengths of rod that must be accurately centerpunched on their ends can be hit "on the nose" with this setup.

Mount the work in the 4-jaw chuck and center it with a dial indicator, the free end supported by the tailstock. Pass the long centerpunch ($\frac{1}{2}$ " drill rod) through a $\frac{1}{2}$ " collet previously set in the lathe spindle. The punch will center itself and a sharp tap with a hammer will mark the work.—*W. B. Goodrich, Somerville, Mass.*



It's easy, inexpensive to fix up your attic with Armstrong's Temlok



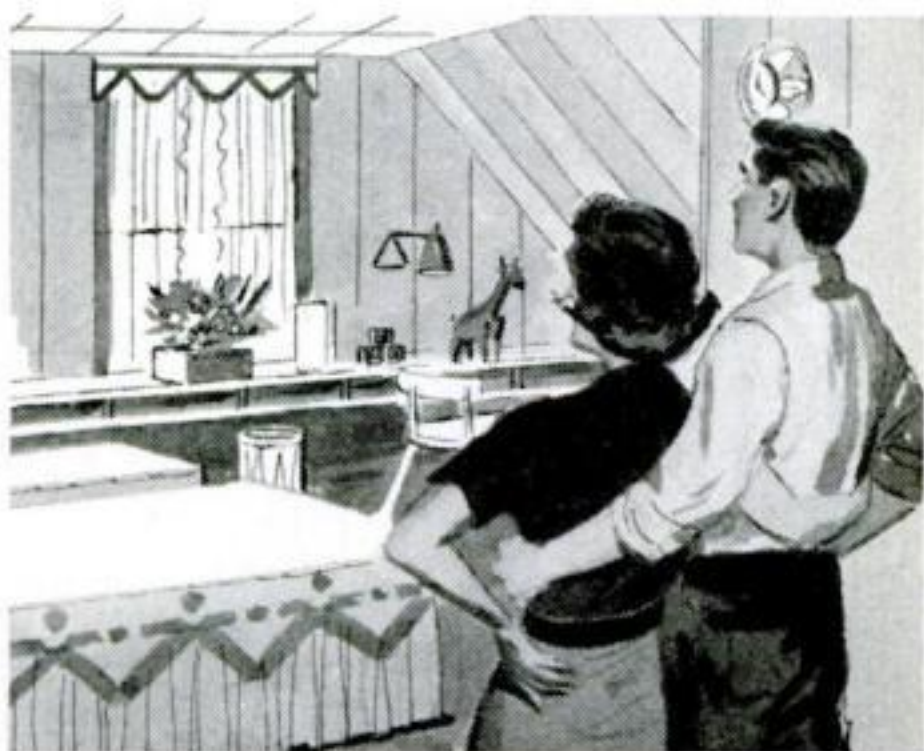
1. You can turn a dark, dusty attic into a cheerful bedroom in a few days with Temlok Tile and Plank. Temlok is a durable, inexpensive wood fiber material that builds, decorates, and insulates. First, nail 1"x3" furring on 12" centers to all framing members.



2. Walls go up fast with Temlok Plank. The smooth, long planks are easy to handle. Temlok's exclusive Lok-Bevel Joint makes nailing or stapling extra fast. Planks come pre-finished in "Suntan Blend," a random coloring. Sizes: 8", 12", 16" wide; up to 12' long.



3. Ceilings no problem with Temlok Tile. Comes factory painted in Snow White and Light Ivory . . . gives ceiling high light reflection. Lok-Bevel Joint hides all nails and staples, almost anyone can do a neat-looking job in a short time. Sizes: 12"x12", 16"x16", 16"x32".



4. Job done in a day or two. Once Temlok is up, move in the furniture, and you'll have a comfortable attic room at remarkably low cost. Your family will be after you to fix up the basement with Temlok next. Get Temlok at your lumber or building supply dealer.



For Free Booklet, "New Ways to Remodel Your Home," write Armstrong Cork Company, 3701 Washington Avenue, Lancaster, Pennsylvania.



ARMSTRONG'S TEMLOK®

Monowall®

Cushiontone®

Insulating Wool

Hardboards

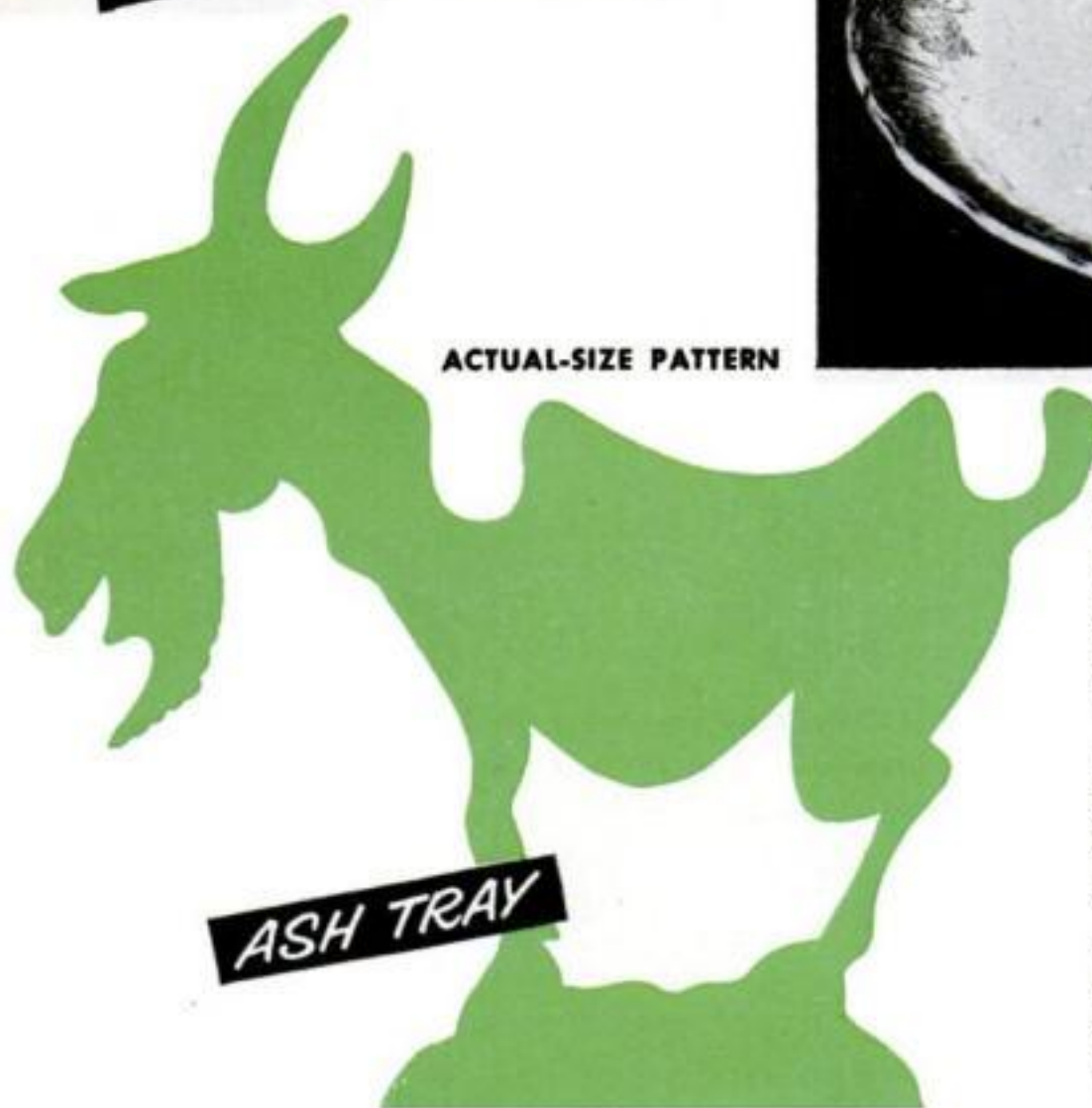
Counter-top Cement

JANUARY 1954 235

One Evening Shop Projects



ACTUAL-SIZE PATTERN

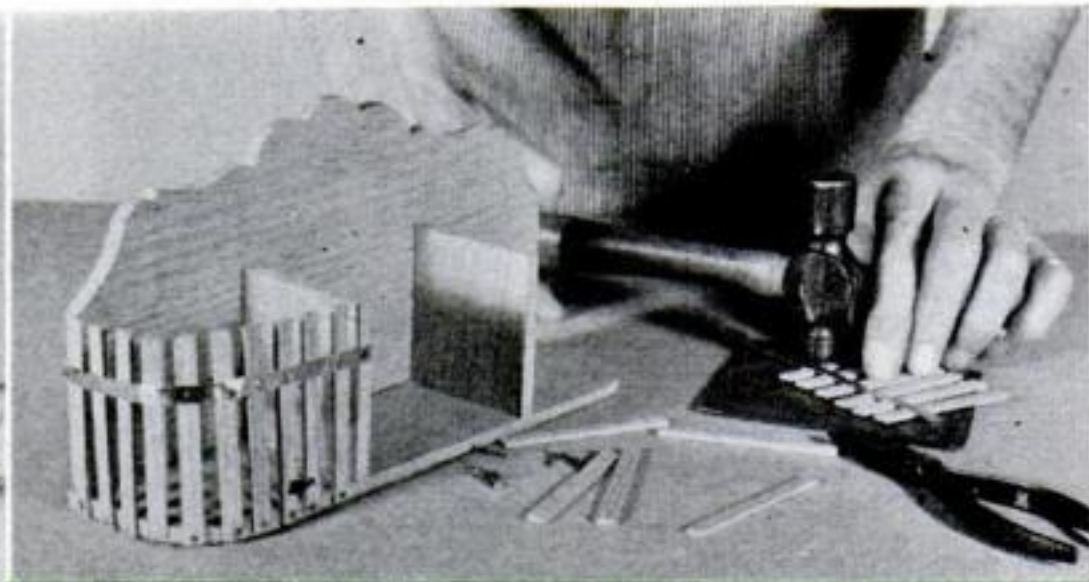


ASH TRAY

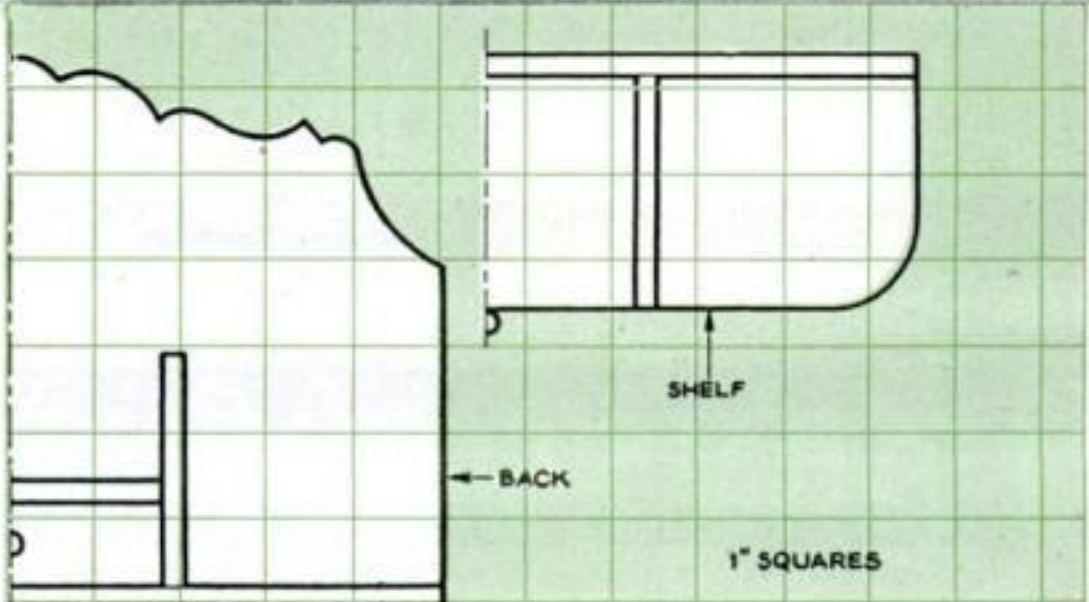
No butts about this ash tray. Rubber-cement the old goat's paper likeness on sheet brass. Cut the outline with a jeweler's saw and smooth all edges with a fine file. Solder the round head of a No. 6-32 bolt in the notch in the bottom and pass it through a hole drilled in the center of a metal tray or china saucer, where it's secured with a thin nut. For china, drill hole with a $\frac{1}{8}$ " brass rod, rotated in a little pool of No. 150 silicon carbide grains mixed with turpentine.—Walter E. Burton, Akron.

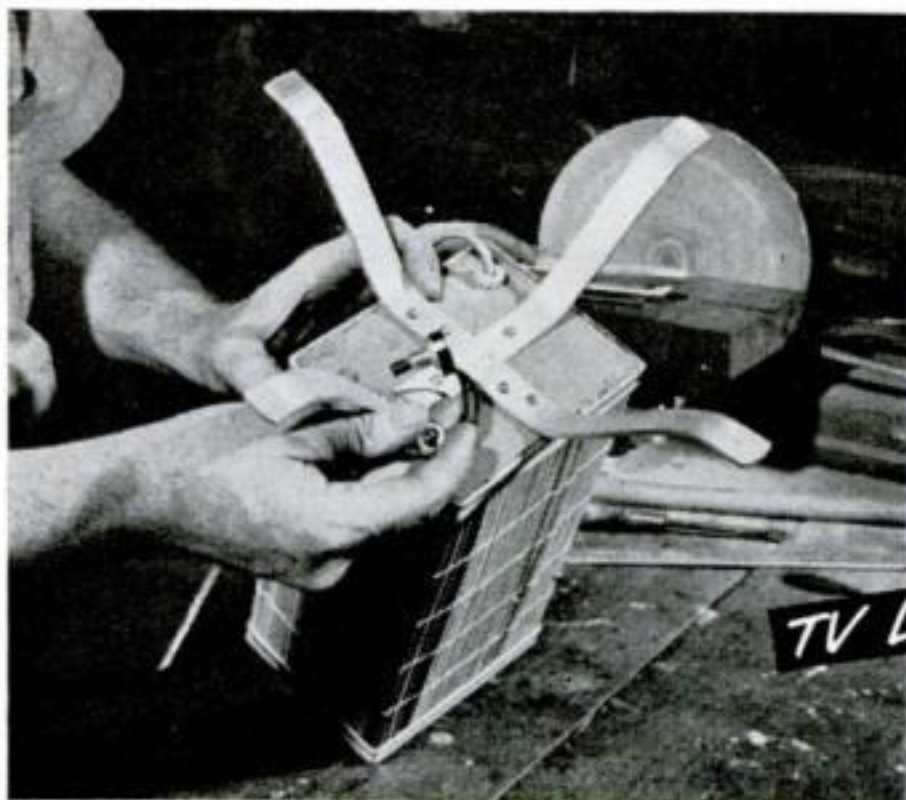


CLOCK GARDEN



Old hardwood boards, some $\frac{1}{16}$ "-by- $\frac{1}{4}$ " strips of the same material, and a couple of sheet-metal bands are needed to make this flower-flanked clock shelf. Glasses holding water for the cut blooms are set behind the miniature picket fence, formed by riveting the metal bands to the upright strips. A drawer for house keys provides a raised base for the clock.—Richard Mandle, Pompton Lakes, N. J.

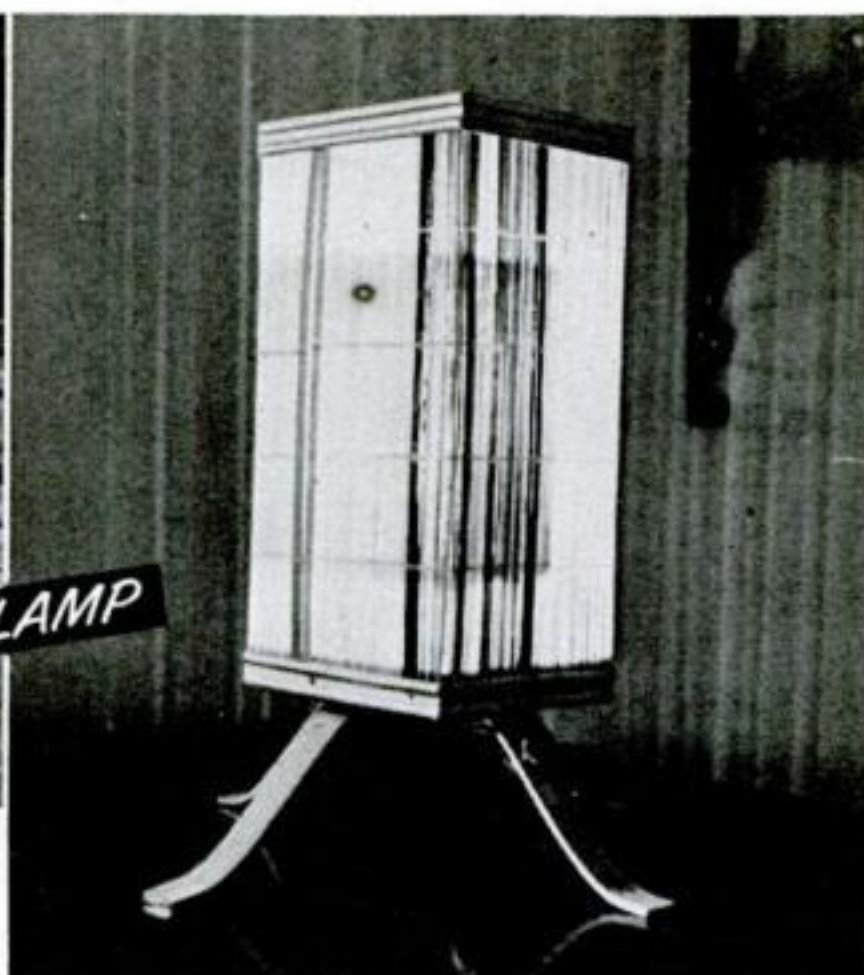




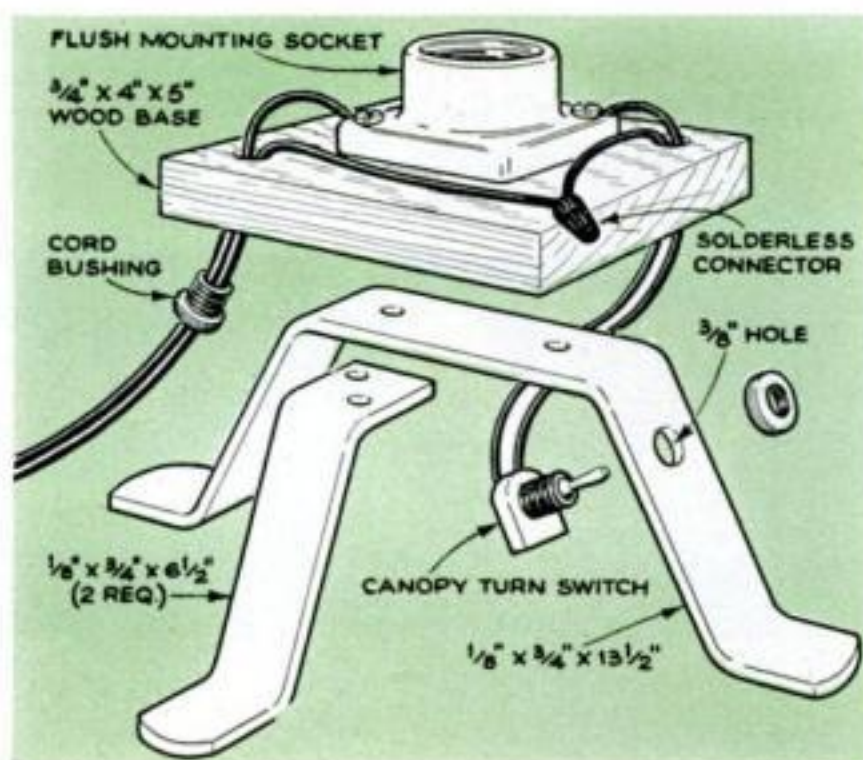
LEGS ARE BENT from $\frac{1}{8}$ "-by- $\frac{3}{4}$ " strip aluminum, two from a single length and two from separate pieces. Drill a hole in one leg for a canopy switch.

The colorful shade of this lamp comes ready-made as a 12"-by-18" bamboo place mat. From $\frac{3}{4}$ " wood, cut a 4"-by-5" block, around which the mat just fits snugly. Drill a corner hole for the lamp cord and another opposite for the switch leads. Fasten a flush-mounting socket in the center. Drill two holes in each leg piece for $\frac{3}{8}$ " wood screws. Then screw on the legs and complete the wiring.

Cut 2" from the width of the mat. Glue it around the base, bend a strip of light aluminum molding or linoleum binding around over it, and secure with escutcheon pins. Tie the ends of the mat together with a strong thread midway and at the top. Then shape a second piece of molding like the first. Cement it around the top of the shade. Use only small bulbs that cannot touch the shade.



ENOUGH LIGHT to brighten your TV area without washing out the picture is provided by a 25- or 40-watt bulb. Striped shadows are cast by unfrosted bulb, which requires a frosted acetate shield inside shade. A frosted bulb will cast a soft glow.



JEWEL BOX

A short piece of copper stack pipe of $3\frac{1}{8}$ " diameter, left over from a plumbing job, provided the inspiration and center section for this project. You can quickly fashion the square mahogany base and octagonal lid which convert it into a handsome jewel box. Rout shallow recesses in each of the hardwood members to receive the pipe, and glue suede or felt in them to serve as cushioning. Mount a knob on the lid.—*Clifton Morris, Lubbock, Tex.*





Bearings Banish Swing Squeaks

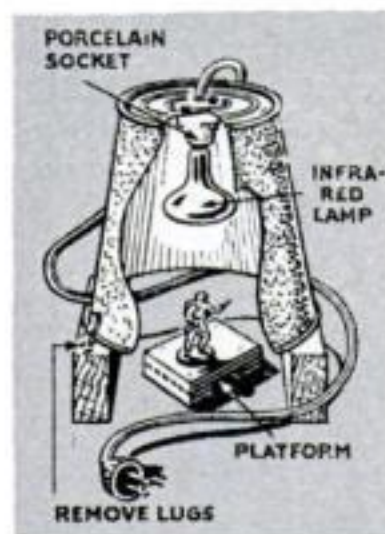
IF THE noise of rusty chains on a backyard swing jangles your nerves, here's a cure. Take two eye bolts. Add two ball-bearing rings that press nicely into the eyelets. For the shackles, use $\frac{1}{8}$ " flat stock, washers and stove bolts. Bolt one end of the shackles to the bearing raceways and the other to the chains. Pack well with grease.—Karl Greif, Vestal, N. Y.

Stainproofing Clothespins

STAINS on clothing caused by dirty clothespins can be prevented this way. Wire open the jaws on each pin, then dip the ends in white-rubber tire coating and let dry. The smooth rubber finish will seal the wood pores and keep dirt from accumulating.—Ken Murray, Colon, Mich.



Bucket Makes Drying Oven



AN OLD pail will provide you with an oven in a hurry when you need it for drying freshly painted or water-soaked small parts. Use a 10-quart size. Cut off the handle lugs and cut a hole in the bottom to hold a porcelain socket. An infrared

bulb mounted in the socket will soon dry parts laid on the wood platform below it.—Harry J. Miller, Sarasota, Fla.



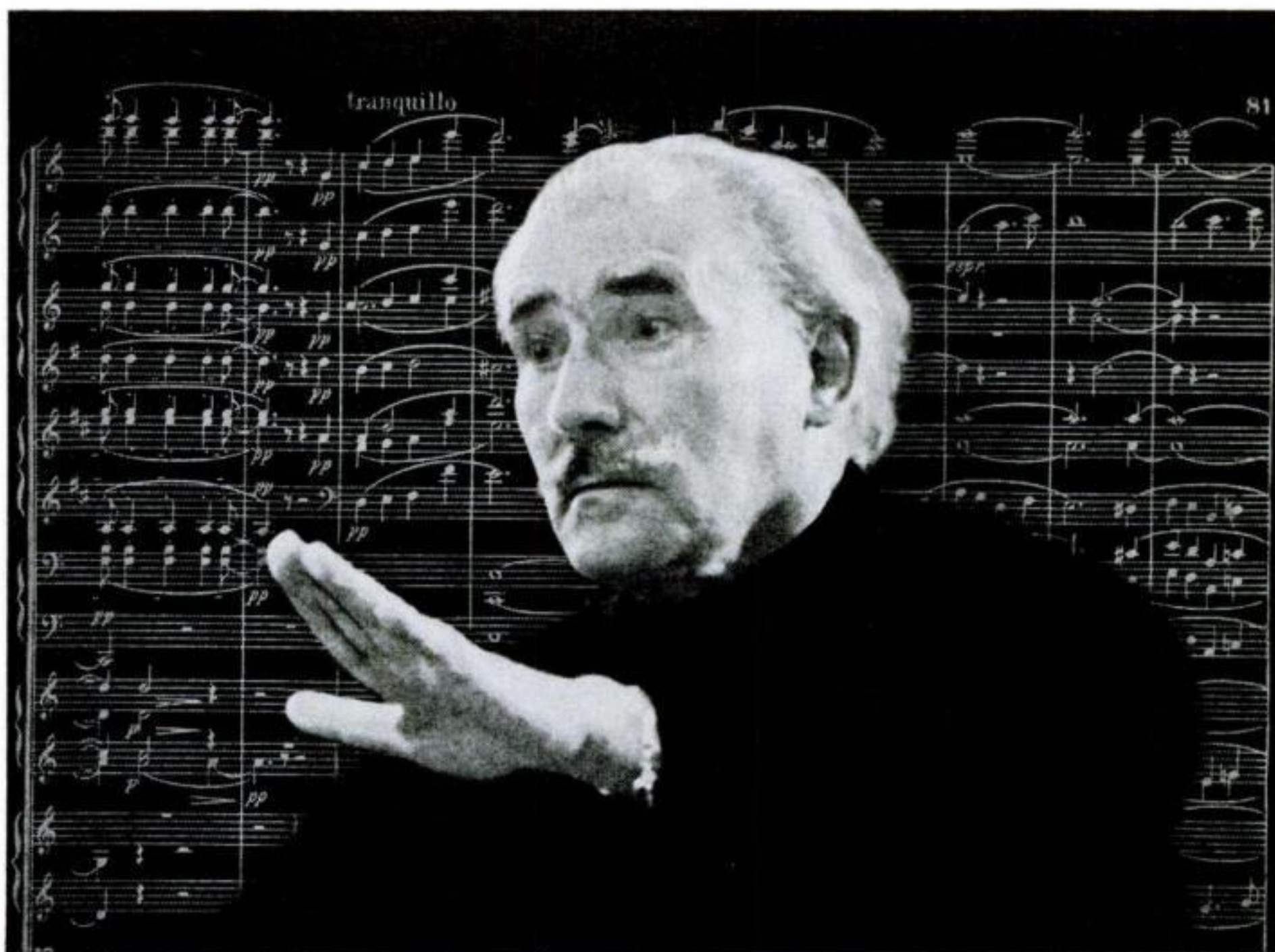
CIGAR-BOX QUIZ

Dig into the cigar box and try to identify these nuts. Invert the page to score yourself.

By C. B. Colby



1. square; 2. hexagonal; 3. jam; 4. castellated; 5. wing; 6. cap or acorn; 7. fiber-lined stop nut; 8. thumb



Arturo Toscanini conducting "Death and Transfiguration," Opus 24, by Richard Strauss

RCA High Fidelity brings you every musical note!

RCA Victor High Fidelity is the result of a half century of leadership in recorded music, in phonograph research and in the development of radio and motion picture sound equipment. It is a great new dimension in sound created by the perfect union of recorded music and the phonograph.

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ords, and "intermatched" high fidelity equipments for those who want to assemble their own units—all are designed to work perfectly together to bring all of the brilliance of the original performance into the home.

The nation-wide interest in high fidelity reflects the public's growing taste for the highest quality in recorded and broadcast music. Developments by RCA scientists and engineers now make it possible for you to enjoy this new musical experience.



RADIO CORPORATION OF AMERICA

World leader in radio — first in television

Tailored Chair Is



Separate cushions let you try this chair on for comfortable fit before you finish building it.

By Willard Allphin

LIKE a tailor-made suit, the most comfortable chair in the world is one proportioned to fit *you*—not some statistically average spook dreamed up by a furniture designer.

The cushioned seat and back of this form-fitting chair were built first. Temporary legs and back bracing were then screwed on so that various leg lengths and tilt angles could be tested. These were experimentally modified until the chair felt just right. We even had a few "fittings" several days apart to be sure the mock-up was correct. Only after the chair had passed this trial was the

frame "finalized." The dimensions given are those for a chair that suits a tall, fairly slim person; perhaps you'd want to modify them a bit if nature made you differently.

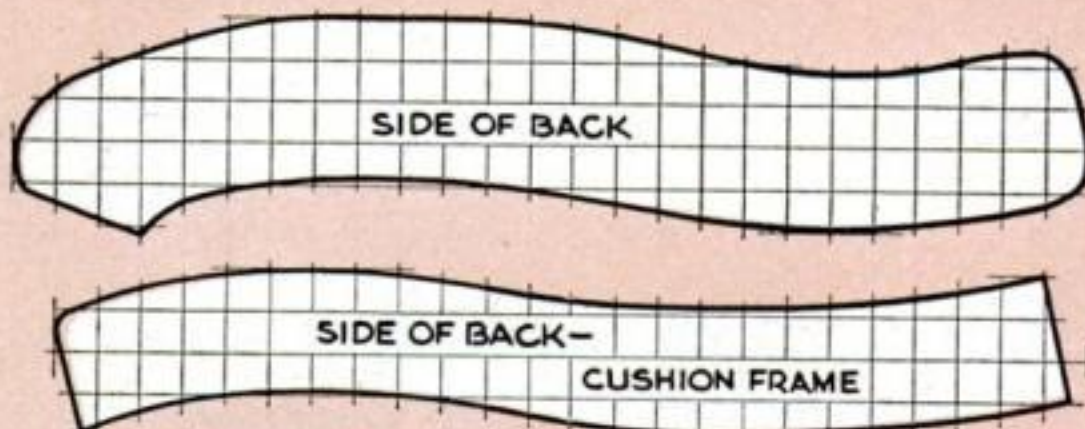
There are other virtues to the design: It will harmonize with either a traditional or modern interior. It can be built with hand tools, although a band- or jigsaw would certainly help. Even though the chair is contoured, no headachy wood bending is necessary. Making the cushions separate rather than integral may seem old-fashioned but it has advantages—you can handle the upholstery easier, you can do the trial-fitting

LIST OF MATERIALS

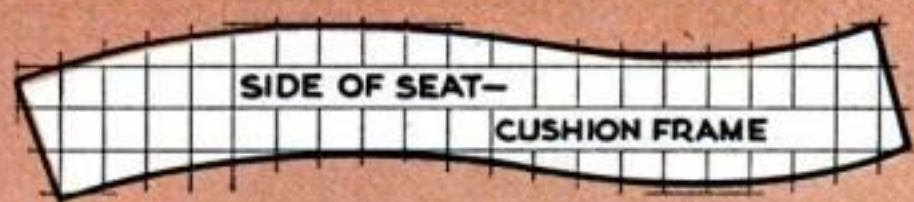
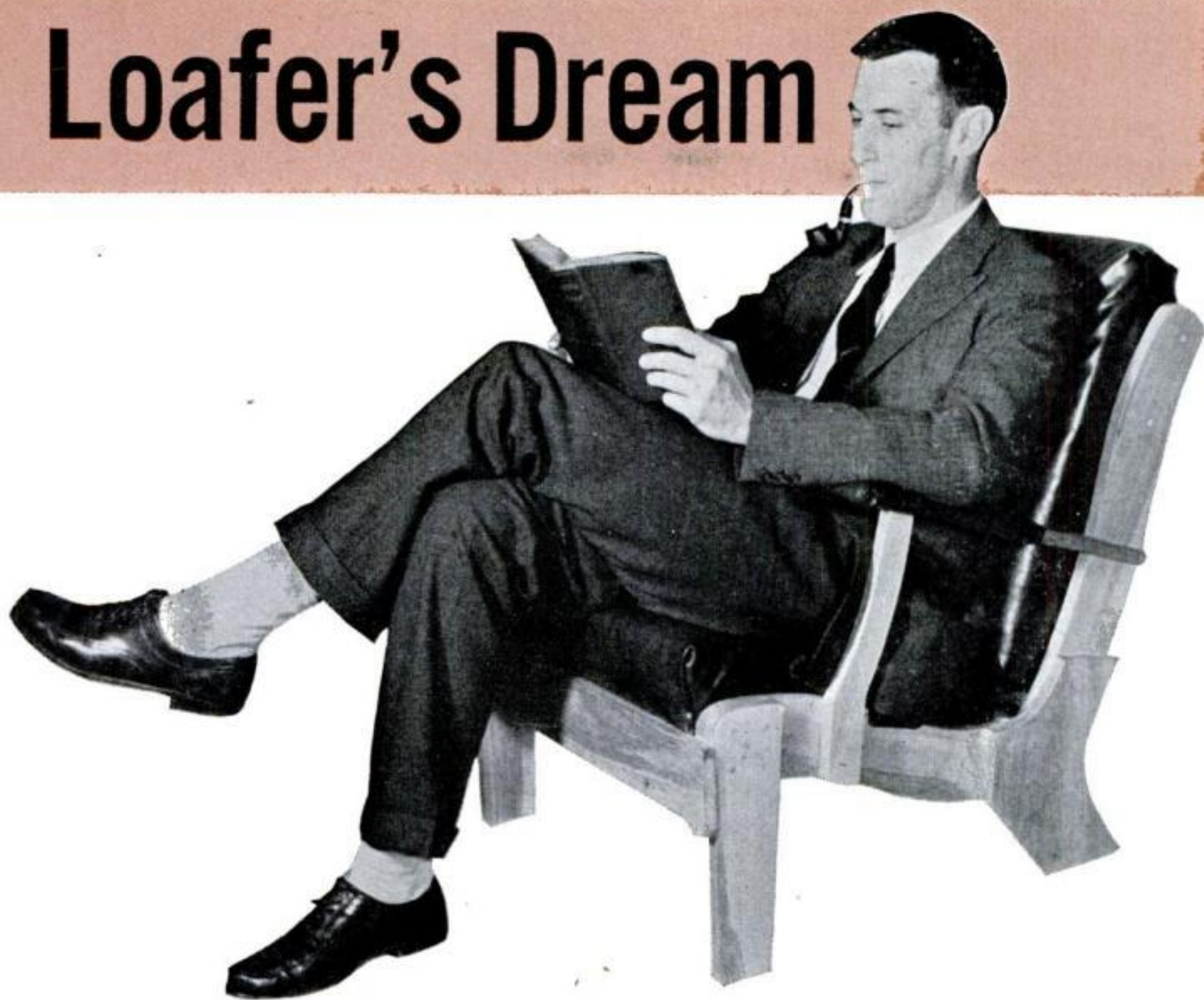
- 2 pieces 1" by 10" by 10' hardwood
- 8' of 1" by 8" hardwood
- 1½ yards 50"-wide upholstery fabric
- 1 piece 1" by 21" by 21" foam rubber
- 1 piece 1" by 21" by 26" foam rubber
- 2 yards muslin
- 2 yards burlap
- 15 yards 3½" upholsterer's webbing
- 2 yards 1" cotton felt
- 4 lb. upholsterer's moss
- 10 yards linen thread
- 5 dozen 1½" No. 10 flathead wood screws
- 3 dozen 1¼" No. 10 flathead wood screws
- 2 boxes No. 8 cut tacks
- 2 boxes No. 6 cut tacks
- 1 box No. 3 gimp tacks



CURVED PIECES are cut most easily by scaling up these drawings (made on 1" squares) onto stock. All pieces not sketched are straight. Though chair fits body, no pieces are bent.



Loafer's Dream



trick much better, and you can improvise summer slip covers very simply just by wrapping cloth around a cushion and pinning it behind.

Frames first. Start by making the back- and seat-cushion frames, and upholster them—at least up to the muslin-cover stage

—so you can make a mock-up to try proportions. Use any hardwood that will accept tacks. (I cannibalized a mahogany table.)

The shape of the slightly curved sides of each frame is shown in the drawing; the crosspieces are of course straight. Make the seat-cushion frame 18½" square, inside, and

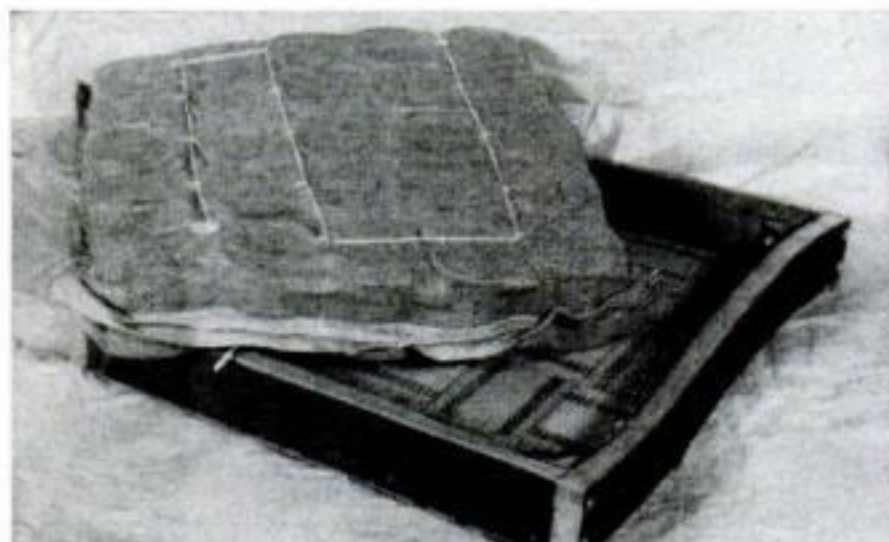
How to Upholster Your Loafing Chair



1 TACK 3½" WEBBING across bottom of each frame. Fold webbing under at the start, and drive in five No. 8 tacks. Stretch with webbing stretcher, and drive three tacks.



2 CUT OFF webbing about 1" long, fold over and drive in two more tacks between the previous three. When webbing is complete in one direction, weave in transverse strips.



3 ASSEMBLED SPRING SETS, obtainable at upholstery-supply stores, are handier than tying off springs yourself. A 25-coil unit goes in seat, a 30-coil unit in the back.



4 DROP SPRING UNIT IN FRAME and cover with burlap panel. Fold edge under and secure with No. 6 tacks. In this and most operations, put first tack in middle and work out.



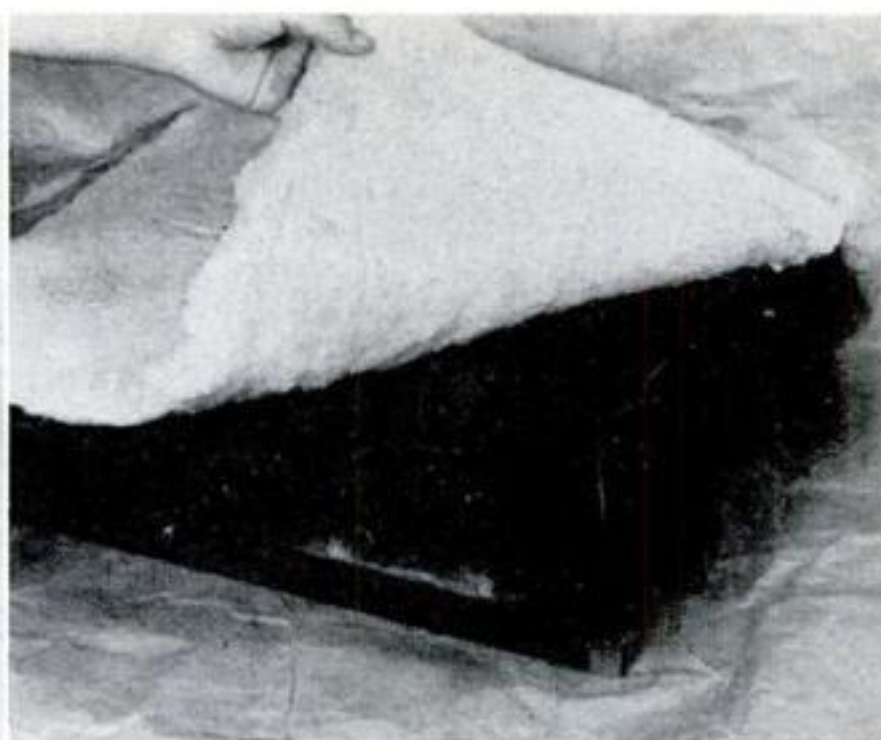
5 A STUFFED ROLL goes on front of seat, top of back. Tack on a 3" burlap strip, add upholsterer's moss, roll back and tack again. Knitting needle helps break up lumps.



6 BRIDLED EDGE is term for big twine loops stitched at sides. The purpose is to keep moss padding from working away from edge. Fluff out moss and tuck under the loops.



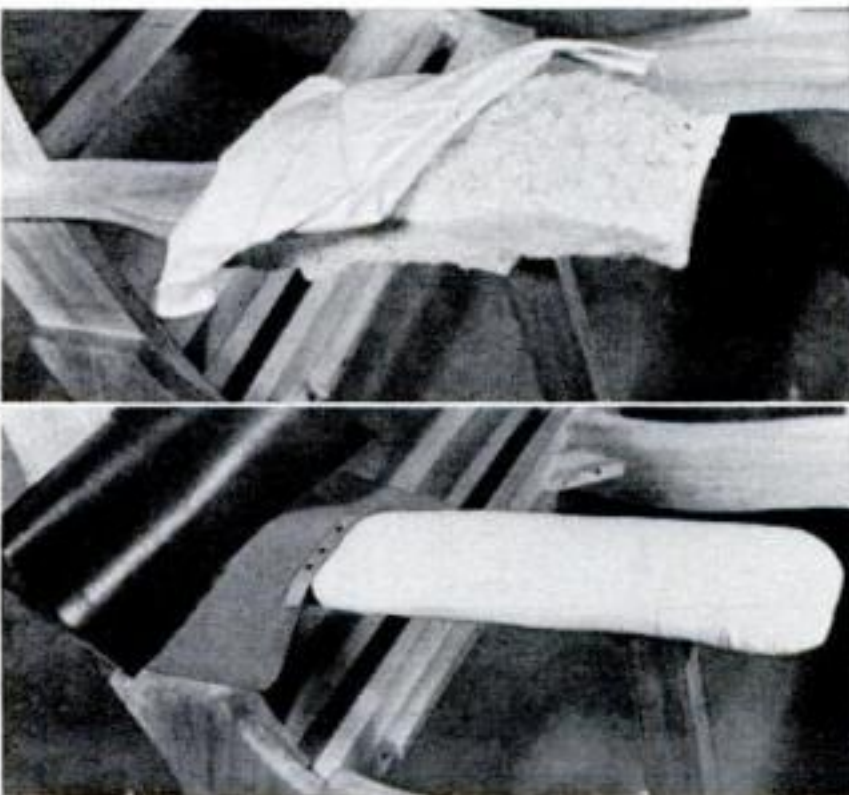
7 COVER CENTER with more moss that has been fluffed out, building up slightly above the height of bridled edges. Big stitches of twine hold moss to burlap underneath.



8 COTTON FELT 1" thick goes over the moss, and is in turn covered with muslin. Use No. 6 tacks to hold muslin to bottom of frame. Now cushions are ready for trial.



9 FINAL COVERING is plastic leatherette over foam-rubber pad. Attach to bottom of frame with No. 8 tacks. At corners, make tuck held by No. 3 gimp or ornamental tacks.



10 UPHOLSTER ARMS by covering cotton felt with muslin, tacking underneath (upper photo). To conceal tacks in final covering, start by tacking through strip of cardboard (lower photo). Then pull material forward and around and tack underneath.

the back $18\frac{1}{2}$ " by $21\frac{1}{2}$ ", inside, assuming you use $\frac{3}{4}$ " stock. Screw and glue the frames together and glue in corner blocks. "Break" all sharp edges, and cut a $\frac{1}{4}$ " chamfer on the front top edge of each frame.

For upholstery, follow the steps given in the sequence photos. Once the two cushions are done and the leg and back proportions determined, begin the chair frame itself, using any good-looking hardwood. All joints should be both glued and screwed, using No. 10 flathead screws in holes that are counterbored and plugged with identical wood. Fasten the front legs to the side rails first so that the two can be sanded to a flush upper edge. You'll find it more convenient to make up each side complete before adding the cross members. Corner blocks under the seat help support it and also stiffen the structure.

I used oil- and wax-finished light birch, with maroon leatherette upholstery. Although the chair looks fine, its strong point is something else: pure unalloyed comfort—a chair for expert loafing.

Small Hole Neatly Bored Larger with Help of Dowel

To AVOID chewing up the surface of wood when a remodeling job calls for a large hole in a place already occupied by a small hole, try this trick. Plug the old small hole with a tight-fitting peg or dowel. Then set the screw of the larger bit into the middle of the plug and bore ahead.—*Thomas P. Ramirez, Fond du Lac, Wis.*

You Can Turn Metal into Pleasure or Profit

[Continued from page 224]

diesel power plants you can build from castings.

Most every garage of any size has a bench lathe and uses it plenty. If you are a hot-rod or sports-car man, you'll find it handy for making special jets, dressing commutators, reboring con rods and so forth.

Money from a lathe. As the experience of my banker friend indicates, a lot of guys all over the country are making their lathes pay off. Many began in the war at tiny sub-sub-subcontract jobs and have kept it up ever since. There's also a continuing field for one-man lathe shops in turning out scientific and hobby equipment.

One man I know turns out special lens mounts for camera fans. Another invented and makes a rotating jig for holding insects for entomologists. Another makes de luxe handles for fishing rods.

You should be realistic here, of course. Just because a lathe pays off for some guys in some circumstances, it doesn't necessarily follow that it will for you, or that you'll even want it to. I've noticed, though, that nine times out of 10, the profit-making angle grows out of running a lathe just for fun.

How to start. One big block in the way is that many people think machining is an obscure and difficult art, too tough for them to tackle. The best way to dispel that goofy notion is to buy a book on basic lathe work.

You can get standard texts in most bookstores, or manuals from the manufacturers.

If you go over it carefully, you'll soon discover why *you* can run a lathe. Basically it is a very simple mechanism. You don't need any experience to run it. Just take it slow and easy, reading up on each operation before you begin.

Sure, you'll make a few blunders at first—at least, I did. But unless you fall sound asleep, you won't hurt much more than your work and your pride. A lathe works at modest speeds, and the tool is fed automatically, or by controls inches away from the cutting edge.

My feeling is that you will do best to begin with a 9" or 10" light bench lathe. It is very seldom that you use its full capacity, but when you need it—brother, you need it bad. A smaller one doesn't cost very much less. And bench lathes of this size are standard equipment, so when you want to trade it in the value will stay up.

One or two other power tools are very useful adjuncts to a lathe, notably a drill press and a bench grinder.

If you do take the plunge for a lathe, I'll make a prediction: you've bought yourself about the greatest source of enjoyment for the money that you could possibly buy. You'll discover skills you never dreamed of, and days and years of fun. **END**

PIPE DIMENSIONS

Nominal Size	Actual Inside Diameter	Actual Outside Diameter	Threads Per Inch
1/8	0.269	0.405	27
1/4	0.364	0.540	18
3/8	0.493	0.675	18
1/2	0.622	0.840	14
3/4	0.824	1.050	14
1	1.049	1.315	11½
1½	1.380	1.660	11½
2	1.610	1.900	11½
2½	2.067	2.375	11½
3	2.469	2.875	8
3½	3.068	3.500	8
4	3.548	4.000	8
4½	4.026	4.500	8
5	4.506	5.000	8
6	5.047	5.563	8
7	6.065	6.625	8
8	7.023	7.625	8
9	8.071	8.625	8
10	9.041	9.625	8
11	10.192	10.750	8
12	10.136	10.750	8
14	10.020	10.750	8
16	11.000	11.750	8
18	12.090	12.750	8
20	12.000	12.750	8

FOR YOUR POPULAR SCIENCE MONTHLY INFORMATION FILE

NOTE: Dimensions above, in inches, are for standard steel and wrought-iron pipe.



20" JIG SAW

With completely built-in motor. Table tilts to 45°. Built in blower. Blade turns to rip. Available with mitre gauge and rip fence.....

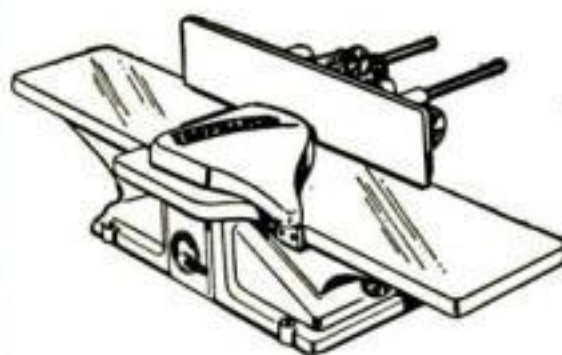
\$41⁵⁰



10" TILTING TABLE BAND SAW

All cast tool of rugged aluminum alloy. 10 by 10 table top. Has excellent locking mechanism.....

\$49⁹⁵



6" JOINTER-PLANER

Professional model with latest cutting head. Cuts 1/2 inch deep and 6 inches wide. Removable guard..

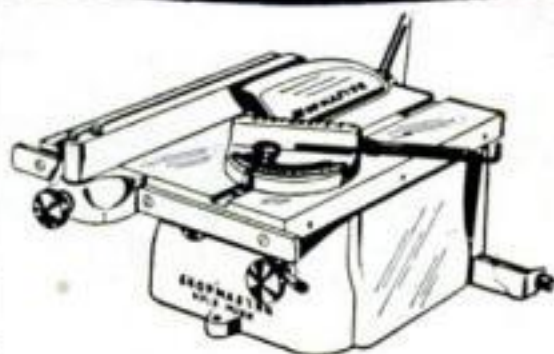
\$86⁵⁰



12" DRILL PRESS BENCH MODEL

Equipped with Jacobs Chucks, three-spoke feed wheel. Shaper attachments available.....

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8" TILTING ARBOR SAW

Heavy duty construction. Sealed-for-life ball bearings. Table size 13 by 16. Complete with mitre gauge and rip fence.....

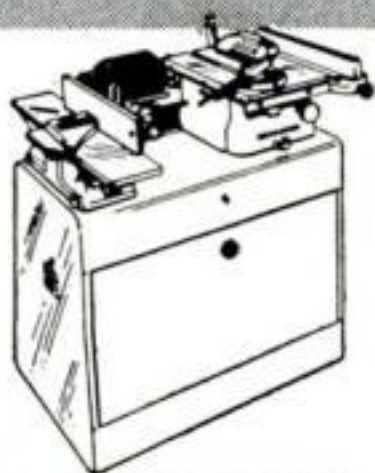
\$51⁹⁵



9 IN 1 UNIVERSAL TOOL

Has sturdy workbench stand. Adapts quickly to Circle Saw, Drill Press, Sander, Shaper, Router, Lathe, Jointer, Grinder, or Buffer. All in one tool.....

\$269⁵⁰



DUAL CIRCLE SAW-JOINTER

New combination dual purpose tool, complete with motor that switches easily from one tool to other. Complete with motor.....

\$154⁶⁰



COMBINATION BELT AND DISC SANDER

Ruggedly constructed. Table tilts to 45°. Entire sander tilts to vertical position. Has belt tension knob and lock.....

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Prices slightly lower in Zone 1

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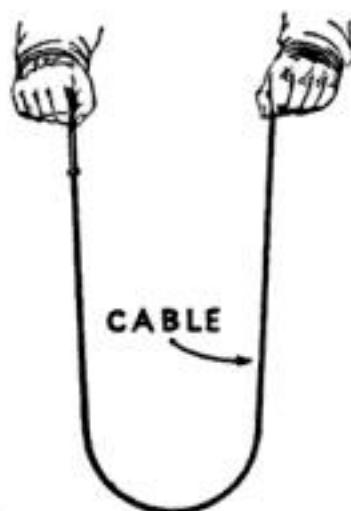
BY S. P. CORP

FLIRTATIOUS SPEEDOMETER

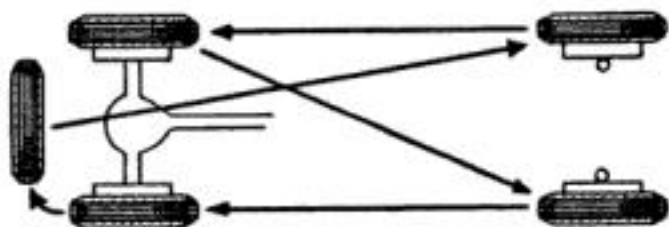
When your speedometer becomes noisy and waves at you, it's time to inspect the head and the cable. To test for tightness in the head, disconnect the cable casing up under the instrument panel and pull cable out of casing. Then insert upper end of cable back into the speedometer head and spin it between your thumb and finger. If cable turns hard, the head should be removed for internal repairs.

Next, inspect cable for breaks, worn spots, or kinks. Hold both ends of cable as shown and turn it slowly. A kinked cable will "flop" and you need a new one. Check casing carefully and replace it if distorted or broken. Remove any sharp bends. Before putting cable back in casing, spread a thin layer of high-low temperature grease over the lower two-thirds of the cable. As cable is installed, entire cable will be lubricated.

Make sure that cable enters the socket in the worm gear by turning cable until connection is made. Be sure upper end of cable is seated in speedometer socket before connecting upper end of casing to speedometer head.



CROSS TIRES EVERY 5000 MILES



Your tires will last longer if you cross them every 5000 miles, as shown above, to counteract the uneven wear which occurs when a tire is left on the same wheel continuously. As tires are rotated, remove any metal or foreign material imbedded in the treads. If treads are worn smooth, replace them for winter driving and thus reduce the danger of skidding. Be sure to have any cuts repaired, as water or dirt penetrating to the cords can cause rapid deterioration of the tire.

WRITE FOR FREE BOOKLET

"MORE POWER, Less Oil, Less Gas," is a free illustrated manual of car care which may save you a lot of money. It tells all about Sealed Power KromeX Full-Flow Ring Sets and the famous MD-50 Steel Oil Ring with the Full-Flow Spring, which does the best possible job of oil control, even in badly tapered and out-of-round bores. To get your free copy, write a card to Sealed Power Corporation, Dept. H-1, Muskegon, Michigan.



You Can't Blow Your Horn in Memphis

[Continued from page 154]

more than any vehicle: it shot the decibel count up to 34.

Hence the wrath of the law falls upon horns. It falls especially on the ancient practice of summoning a date or a fishing companion from house to curb on the horn button. It also falls on those fancy double air horns which some auto enthusiasts like to mount on fenders. These are banned in Memphis, as are horns which play a tune.

Many Other Noises Banned

The city's basic ordinance is supplemented by numerous others. Bicycles may carry no siren or whistle. Hospital zones require a double dose of silence. Train whistles can be blown only briefly and only when state law requires it. Aircraft must fly at an altitude of at least 2,000 feet. Fireworks are absolutely banned.

A special ordinance makes it an offense to disturb public worship by noise or rude, profane discourse. The auto-inspection law requires every car to be inspected three times a year, and motorists with faulty mufflers have to buy and install new ones before their cars get stickers.

Memphis is an Egyptian name meaning "place of good abode." Citizens of the Tennessee Memphis are proudly certain that they are living up to the name. The most noise they make is in proclaiming how quiet their city is. **END**

The Easy Way

ONE of the greatest marksmen of the FBI was passing through a small town and everywhere he saw evidence of the most amazing shooting. On trees, walls and on fences were numberless bull's-eyes with the bullet hole right in the center. He asked to meet the man who had done the shooting. It turned out to be the village idiot.

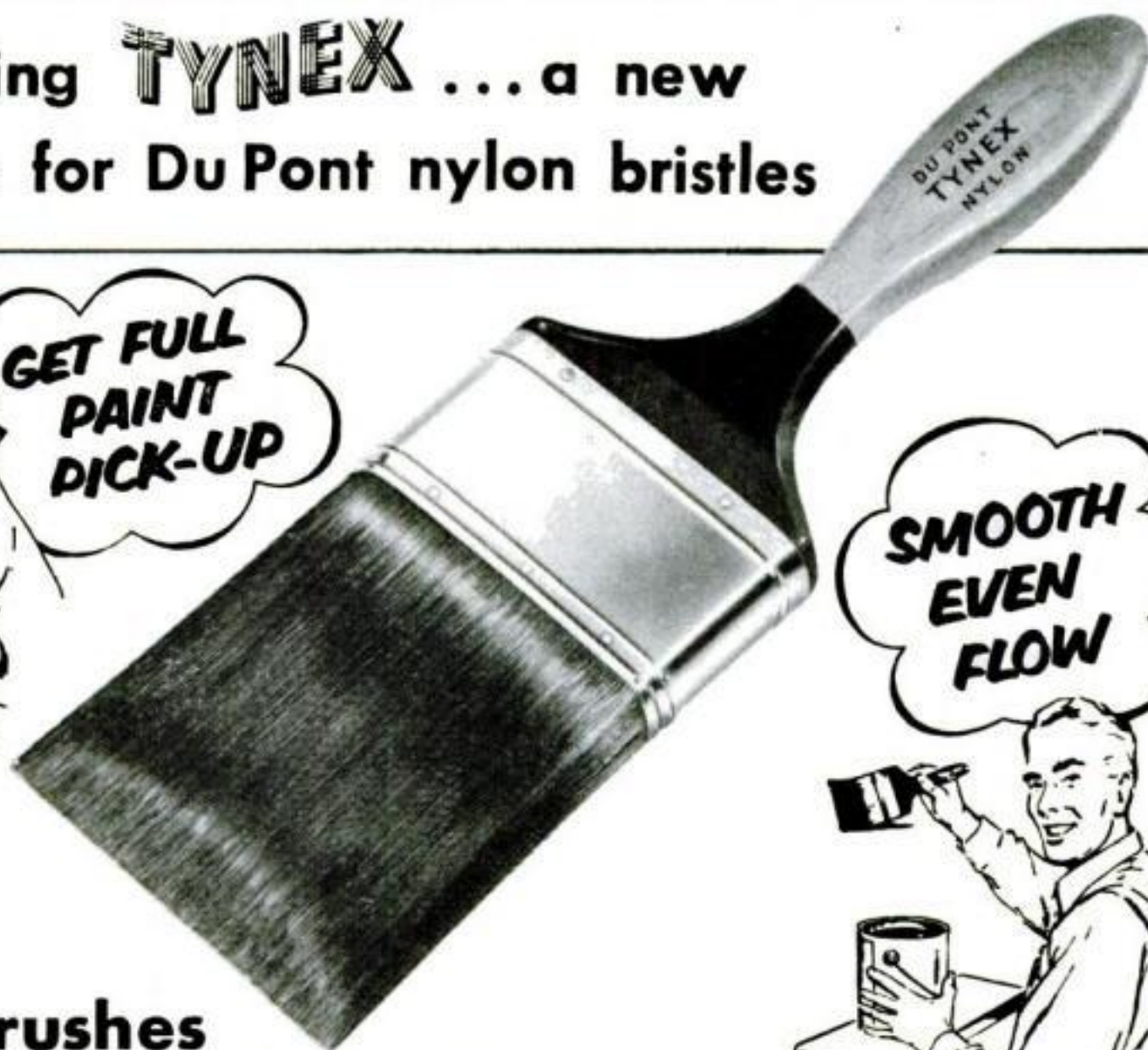
"This is the most wonderful marksmanship I have ever seen," said the FBI man. "How do you do it?"

"Easy as pie," replied the village idiot. "I shoot first and draw the circles afterward."—*The Kablegram.*

Announcing **TYNEX** ... a new
trade-mark for Du Pont nylon bristles



GET FULL
PAINT
PICK-UP



SMOOTH
EVEN
FLOW



choose brushes
with bristles of Du Pont

TYNEX

nylon

To assure you of highest-quality bristles when you buy paintbrushes, Du Pont has adopted the trade-mark "Tynex" for bristles of genuine Du Pont nylon.

"Tynex" nylon bristles help make painting easier and faster. Brushes with long, tapered, well-tipped "Tynex" bristles pick up a full load of paint... flow it on smoothly and evenly. Home painters know from experience that "Tynex" bristles are easy to clean with any commercial cleaner... won't break off... last three to five times as long as other types of bristles.

"Tynex" has been granted the Good Housekeeping Guarantee Seal. Leading brush manufacturers are now using the trade-mark "Tynex" to identify genuine Du Pont nylon bristles in all types of paintbrushes. So next time you buy brushes, look for the word "Tynex" on tags and brush handles. It's your guarantee of work-saving, long-lasting bristles of Du Pont nylon!



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UP and DOWN
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IN TWO SIZES

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Height from: 24" to 33 1/4"
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Shipping weight: 36 lbs.

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Sets of casters or rubber feet available at nominal cost.

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How to Keep Things Up

[Continued from page 217]

to be used and the size of the hole to be drilled.

When you have a really heavy load to go on a frame wall, you must fasten hangers or brackets to the studs themselves.

How to locate studs. Most builders place studs 16" from center to center. Some may use 12" centered studs. On inside partitions, stud spacing may be varied further, particularly when the wall material does not come in standard 48" widths. Here are some ways of finding them.

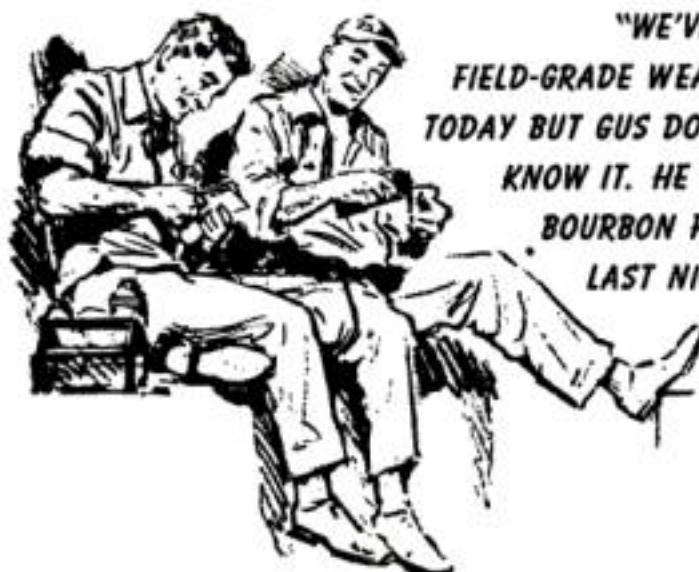
1. *Tapping.* Wrap a piece of thick cloth over the head of a light hammer and tap on the wall sharply in the area you want to drill. When you come to the stud, the tapping will sound duller.

2. *Nailheads.* Examine the upper part of the baseboard for evidences of nailheads. If you can find any, they should have been driven into the studs.

3. *Drilling.* If you are erecting a permanent piece which will cover the wall, drill a horizontal line of holes about 1" apart until you hit a stud. The piece will hide them later.

4. *Baseboard.* Carefully remove a section of baseboard below the area you want to drill. Usually the studs will show. If they are covered with a wallboard, you can drill a series of holes below the baseboard top and locate the studs.—Will Thomas, Buffalo, N. Y.

Shoptalk:



"WE'VE GOT
FIELD-GRADE WEATHER
TODAY BUT GUS DOESN'T
KNOW IT. HE HIT A
BOURBON FRONT
LAST NIGHT."

What are they talking about?

Where do they work? Answer below.

They're mechanics at an Air Force Base. Field-grade weather means clear with visibility unlimited but Gus is fogged in because he had a big night in the non-commissioned officers' club.



Powerful **New** Jig Saw with Built-in Rotary Motor Only **\$23⁵⁰**

Compare it! Try it!
Dollar-for-Dollar,
DREMEL MOTO-JIG SAW
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- Cuts 1½" wood, ¾" plywood, metal, plastic, etc.—will even cut a 2x4!
- New **ROCKER ACTION PRINCIPLE** prevents blade whipping or buckling, eliminates breakage! This revolutionary improvement obsoletes old-style blade tension spring, permits use of finest, fastest-cutting blades in jig saw history!
- **Safe for children!** Blade is completely guarded against finger injuries!
- **4-way blade holder** saws any direction, takes any length stock! Table raises and lowers so you can use every tooth in the blade!—Tilts 45°.

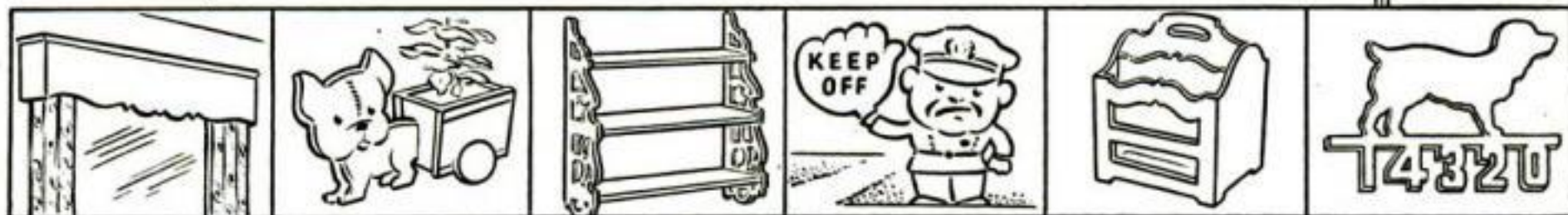


Here's jig saw magic to amaze you! Here's a powerful tool driven by a real rotary motor (not a vibrator) that cuts through wood as fast as you can feed it! Sturdy, compact, and agile, it takes 90° turns at top speed, cuts the most intricate scrolls yet is rugged enough for major household repair jobs! Use it to make lawn furniture, valances, knickknacks, toys. It's ideal for adults, safe for children—an all-family tool! The new Dremel Moto-Jig Saw is so superior to others anywhere near its price class that we challenge you to match it against others costing many dollars more. You'll agree it's the greatest value in jig saw history!

Hobby Project or Household Repair . . . Do it with Dremel—and Save!



Pat. pend.



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FASTEST MOST POWERFUL TOOL IN ITS CLASS—Approx. 27,000 r.p.m. The original "Pocket-Size Machine Shop." The most practical tool a man can own. Indispensable for carving, drilling, grinding, sharpening tools, scissors, kitchen knives, garden tools, lawn mower blades, etc. More versatile than a ¾" drill; lightweight (13 oz.) for hundreds of small jobs—hanging pictures, installing cabinet hardware, hardwood trim, etc. Powerful 110 v. AC-DC motor. A precision tool widely used in industry.

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Model 2 Moto-Tool, 23 accessories (High-Speed Wheel Cutters, Grinding Wheels, Polishers). Packed in sturdy hard-wood case. **\$25.95**

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Look for the Channellock line when you're shopping for hand tools. Channellock pliers offer features that you can't get with other makes. And when you buy a Channellock plier, ask to see the full line—you'll find a style and model to do any job better.



THE PLIER DESIGN THAT OBSOLETE ALL OTHERS

CHAMPION DEARMENT TOOL CO. • MEADVILLE, PA.

250 POPULAR SCIENCE

Gus Answers a Fire Alarm

[Continued from page 196]

many, one extra gust of wind . . . the whole block was threatened.

First he unclamped the distributor cap and checked inside. The points were fine, the blade-spring intact, and the works moved freely without sticking.

"Your mechanic tried everything, Joe?"

"Yes. He couldn't find a thing, though."

Gus Hears the Thunder of Hooves

He made sure there were no air leaks around the intake manifold, that the fuel line was not spilling gas somewhere aft of the carburetor.

Gus stepped back and slapped at a spark on his neck in disgust. As he groped back through his mind for other ideas, he suddenly heard a bell. A bell growing louder and then the thunder of hooves.

He saw the men in the alley scatter and hug the sides of the buildings. And then came a sight the town hadn't seen in over 40 years—Sam Boise in all his glory, coming down the alley in the ancient fire wagon, whipping the horses into a last furious charge, and then the spark-shooting clatter of metal wheels, as he wrestled it to a stop. The firemen gaped as the old man spryly jumped to the ground.

Sam Mans the Spouting Hose

"All right, you young monkeys, hop to it—this ain't no wienie roast! Uncouple that hose on the truck tank and keep my tank full!" Sam Boise pulled the spouting hose to the doorway and began working his way in. A cheer went up.

There was no miracle in the way the old wagon came to life after all those years, not when you knew the loving soul of Sam Boise. It worked, and it worked well. The horses stood in quiet discipline as if the old brigade had never died.

Joe Insley came back to see how things were going. "Found anything, Gus?"

"Not yet." He winced. "The way this darned smoke gets in your eyes! I don't know what to say, Joe. I've checked everything I possibly can."

He started up the engine again, and let her idle. The idle, just as Joe said, was good. He lifted the accelerator arm to feed her more gas, and immediately it died. Gus started and killed her again several times, trying to see what caused it.

[Continued on page 252]

Presenting America's most **SENSATIONAL** saw **VALUE...**

THE NEW



8" TILT/ARBOR, BALL BEARING CIRCULAR SAW

You've never seen a saw with so many value-packed, quality features at anywhere near the sensational low price of the 9310. It gives you the **SPEED, ACCURACY, SMOOTHNESS** and **EASE OF OPERATION** that you'd expect only in a high priced saw. Yet it's yours at an almost unbelievable low price with all these important features —



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less motor,
guard, stand . . .
slightly higher west
of the Rockies

- **TILT/ARBOR CONSTRUCTION** . . . with handy, quick-action controls.
- **BIG, SEALED-FOR-LIFE BALL BEARINGS** . . . long life, smooth action.
- **ATLAS DOUBLE-LOCKING LIFT-OFF FENCE** . . . full length, with Vernier control.
- **BIG CAPACITY** . . . 15" x 18" precision ground cast iron table, 2 3/8" depth of cut.
- **POSITIVE LOCKING MITER GAUGE** . . . accurate, convenient.
- **ONE PIECE BASE** . . . rugged drawn steel, extra rigid.
- **HUSKY STAND** . . . with motor mount . . . neat, compact. Optional.
- **A HUSKY HEAVY-DUTY TOOL** . . . for every operation . . . dadoing . . . shaping
molding . . . rabbeting . . . beveling . . . chamfering . . . ripping . . . cross cutting.

See this new ATLAS before you buy ANY saw!

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you can **DO** so much **MORE** so much **BETTER** with *Atlas*

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**Archer
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LINSEED OIL**

PROTECTS MOST ANYTHING

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101
HANDY USES:

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For years Archer Pol-mer-ik has been the choice of professional painters for paint reducing and brush conditioning. Pol-mer-ik is given a special polymerization process which rearranges and locks together the oil molecules. This process gives you a tougher, more durable paint film than ordinary linseed oil. When you reduce your paints with Pol-mer-ik, they brush out easier, level better, have a smoother surface that collects less dirt, and give you a longer-lasting job! Whenever you paint, use Archer Pol-mer-ik Linseed Oil for better results!



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Gus Answers a Fire Alarm

[Continued from page 250]

"Say, Gus. I don't know anything about engines, but is this distributor supposed to move every time you give it the gas?"

Gus left the engine idling and came around to that side.

"Yes, that's normal. Your distributor moves back and forth with the retarding and advancing action of your timing apparatus. See, as soon as I lift the accelerator arm and give it gas, the engine speeds up and the ignition advances, the distributor turning with . . ."

Engine Speeds Up and Dies

Gus broke off and stared at the distributor as the engine speeded up and died.

"Well for crying— This makes me feel like an oil spot and twice as silly! Turn the ignition off, Joe, so I won't get jolted into next week!"

Gus loosened the bolts holding the coil and moved it closer to the distributor, tying it to the brace that ran from top of the radiator to the bottom of the fire wall.

"How's Sam doing?" he asked over his shoulder.

"He hasn't put the fire out, but by golly he's got it under control!"

"Well, you can add your own hoses to the fight in just a minute."

Pump Settles Down to Work

Gus slammed the hood down, jumped up behind the wheel and hit the starter. The engine cranked for a moment, coughed and then burst into even, throbbing power. He saw the firemen jump for the hoses and when they were ready, he pulled the pump lever and saw the heavy streams of water begin slamming into the fire.

An hour later, the fire was out, and Gus got ready to go. Insley stopped him.

"Just for the record, what was wrong with the truck?"

"Not much. See this short wire leading from the coil to the distributor? It's not the kind that's supposed to be there. You see, not all distributors turn as a whole with the advancing and retarding of the ignition. A lot of them do the turning internally and separately from the outside covering. And this wire was meant for that kind. See how rigid it is? Well, the constant flexing of the distributor body kept working on it until it snapped every little strand

[Continued on page 254]

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306 FRANKLIN ST.
BOSTON 10, MASS.



To protect himself against the attacks of hungry wolves and other dangerous enemies, the bull elk uses his widespread

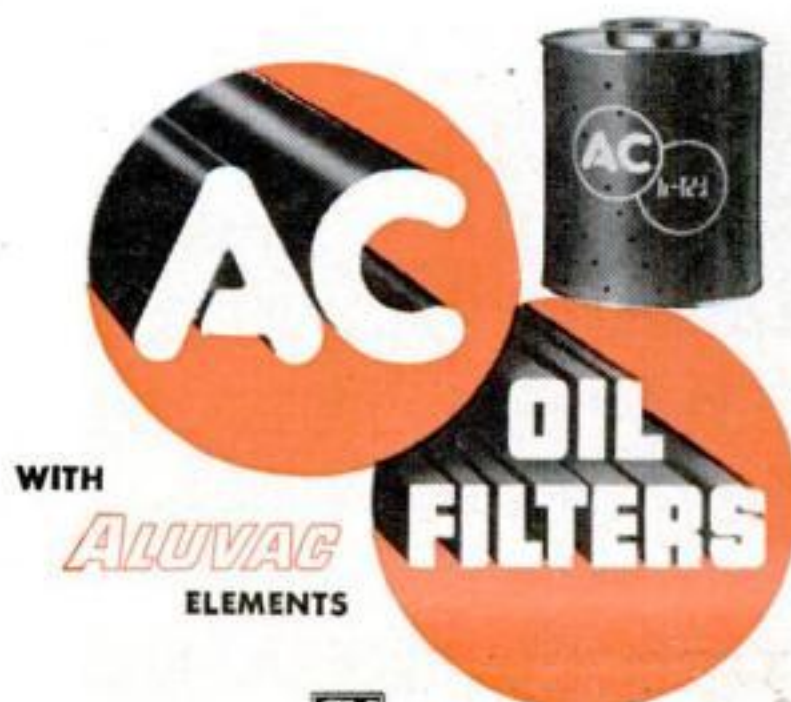
antlers, bristling with sharp tines. Powerful neck and shoulders support these heavy antlers with comparative ease.

Protection *That Counts*

To protect their engines against the dirt and grit that attack precision parts through lubricating oil, careful owners choose AC Aluvac Elements.

- **Microscopic filtration**—AC Aluvac removes sludge and dirt particles as small as 1/100,000 of an inch.
- **Maximum filtering area per cubic inch**—AC Aluvac has 10 times the area of ordinary elements.
- **No harmful chemicals**—AC Aluvac won't remove detergents from heavy-duty motor oil.
- **Acidproof**—secret process renders AC Aluvac material resistant to acid, gasoline and water.

Change your oil filter element at factory-specified intervals—and be sure you get the finest filtration money can buy—AC Aluvac.



AC SPARK PLUG DIVISION



GENERAL MOTORS CORPORATION

JANUARY 1954 253

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POWER TOOL WOODWORKING FOR EVERYONE

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Basing his book on famous SHOPSMITH, an expert tells you everything that can be done with multi-purpose and individual tools. Detailed instructions for the table saw, jointer, drill press, lathe, jig-saw, band saw, abrasive machines, shaper; how to adjust and use each tool, and perform every woodworking operation. Suggested work projects and hundreds of time- and money-saving hints. 560 photographs and drawings. \$4.95 at bookstores, or mail coupon below.

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Weld anywhere with this amazing LOW COST HOBART "Husky-Boy"



air-cooled
engine drive
arc welder

Gets the BIG PAY jobs

Cash in on those profitable emergency repair jobs with the lightweight, easily portable, "Husky Boy" 200 amp. arc welder. For in or out of shop welding you'll get years of dependable service at a low investment cost. Wheels and handles available at slight extra cost.

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With the Hobart "Build Your Own" you can do repair and construction work away from power lines. Make big savings by hooking this AC-AC generator up to your own gas-line engine, truck or tractor.



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Builders of Arc Welding Equipment"

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☐ Electric Drive DC Welder ☐ Hobart Vest Pocket
Trade School ☐ Welding Lessons Book, \$1. Guide

NAME _____

ADDRESS _____

CITY _____ STATE _____



Gus Answers a Fire Alarm

[Continued from page 252]

in the wire. It broke right here at the terminal nut on the distributor.

"The weird part about it is that when the engine is idling, and the distributor is at its full-retarded position, the wire is rigid enough to hold its position and maintain contact. When you give it the gas, the distributor pulls away from the wire, and the wire still standing up makes contact with nothing but air. I didn't see it, because when I checked over that section, it was touching and looked perfectly all right. And the cap can be removed easily without even disturbing the wire. Anyway, I brought the coil closer to the distributor because there wasn't enough slack in the wire to make a new connection. As soon as you get back to the station, get your maintenance man to locate a new wire, and the right kind . . . Say, where did Sam go?"

Gus Visits a Hospital Patient

"I guess you were too busy to notice. Not long after you got the engine started, the old codger collapsed. Little too much smoke in his lungs. He's down at the hospital getting treatment and rest."

Gus walked down to his truck, turned it around and headed for the hospital.

Sam Boise was somewhere on the outskirts of sleep when he saw Gus's face at the foot of the bed. The old boy did look pretty well bushed, but the nostalgia in his eyes was brightened with happiness.

"Well, Sam, you got your wish after all these years."

"Sure did. It was just like the old days. The old rig worked pretty good!"

"It sure did, Sam. If you hadn't come along, the block would have gone up."

"It all goes to show you," the old man chuckled.

"What's that, Sam?"

"The fickleness of engines. Get a horse!"

Gus grinned and watched the old man drift off into a happy sleep.

"You just might be right at that, Sam."

Gus turned and tiptoed out of the room.

END

Definition

MOTORIST: A person who, after seeing a wreck, drives carefully for several blocks.—*L & N Magazine.*

ROSS 4-WAY FOOT OPERATED AIR VALVE



ITEM #60

BRAND NEW—
For double-acting
pneumatic devices.
Fine for operating
presses, air
vices, air ma-
chinery of
many types.
Heavy duty
cast construction.
No neutral position.
Maintains
pressure against
the piston when the
foot control is in the "Up" position.

Threaded for 1/2" pipe. Dimensions
of valve body: 7 3/4" long x 4 1/4"
width x 7 1/2" high. Net weight 28
lbs. A \$64.00
value
for only **19.50** F.O.B.
CHICAGO

EXTRA HEAVY DUTY Double Action HYDRAULIC CYLINDER



ITEM #224. 3 1/4" bore, 24" stroke.
will lift 8250 lbs. with 1000 P.S.I.
line pressure. 1/2" pipe thread ports—
1 3/8" stress-proof ground, polished
& plated solid steel shaft. Overall
length closed 36". 1/4" steel wall
cylinder barrel clevis mounting at
base and shaft. Features—Tie Rod
construction. Honed
barrel. Ship. wt. 50
lbs. F.O.B. Chicago **39.60**

BRAND NEW! JUST RELEASED! BLACKHAWK HAND-HYDRAULIC PUMP



Item #82. Perfect for Hy-
draulic Presses, Snow Plows,
Farm Wagons, Jacks, and
Farm Plows.
A few easy strokes of
the 20" handle and you
can lift 5000 lbs., using
Item 355—Hydraulic
Cylinder.
Blackhawk Model P-151
—complete with built-
in oil tank and release
valve.
Rated 1200 lbs. per square inch.
Dim. 9"x7"x6". Ship wt. 35 lbs.
Worth much more. **22.50**
F.O.B. Chicago

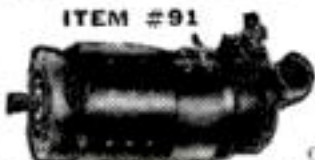
Brand new — DOUBLE ACTION HYDRAULIC CYLINDER

ITEM #355—2 1/2" bore and 7 1/2"
stroke, 1 1/2" stainless steel piston
rod. Lift capacity 5000 lbs., using
1000 lbs. pump pressure. Manu-
factured by Delco-Remy Division of
General Motors Corporation. Clevis
mounting on base and piston rod
for 7/16" bolt. Overall length
closed 21". Distance between
centers 19". Supplied with
fittings to 3/8" pipe
thread. Brand new—
in original carton.
F.O.B. Chicago.



ITEM
#355A—
Same unit,
but supplied
with built-in
spring to provide
cushion effect on
power stroke and rap-
id return.
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CHICAGO **17.00**

D. C. GENERATORS



ITEM #91
Type R-1.
Rated 300
Amps.—30
Volts. Mfd.
by Jack &
Heintz.
Gov't. Acq.
Cost \$380.00.
Ship. wt. 55 lbs. Di-
mensions 16" x 10" x
7". F.O.B. Chicago. **35.00**

ITEM #90—Type P-1. rated 200
Amps.—28 Volts, 2500 RPM. Mfd.
by General Electric, Ford, Delco-
Remy and Westinghouse. Gov't. Acq.
Cost \$300.00. Ship. wt. 55 lbs.
Dimensions
15"x9"x6".
F.O.B. Chicago **22.50**

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MANY ITEMS
JUST
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SHOP BY MAIL
AND
SAVE

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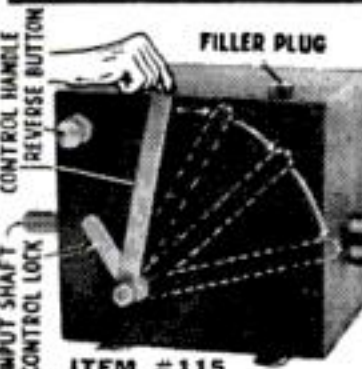
2-TON, 6-WHEEL HYDRAULIC LIFT TRAILERS

USE FOR: Conveyor ramp • Boat trailer • Lumber • Pipe
• Pole trailer • Machinery trailer • Hydraulic dump for
grain wagon • Coal truck • Lift truck • Variable height
hydraulic work table • Removable rack permits use of hy-
draulic lift for other installations. Outstanding features of
these Trailers are:—4000 lbs. pay load, 2 individual hy-
draulic lifts complete with
hand pumps and valves, 6—
18"x5.5 pneumatic tires in-
cluded. Manual screw-down
brakes. Ball-bearing axle.
V-shape load rack—8' long.
Towing tongue, 54" lift.
Wheelbase 98".
Ground clearance
4 1/2". Tread width
—52". Overall width
—58". Overall
length including
drawbar—167". Gov't. cost \$685.00.
Ship. wt. 1400 lbs. F.O.B. Chicago



Item #356
169.50

HYDRAULIC SPEED REDUCER with FINGERTIP CONTROL



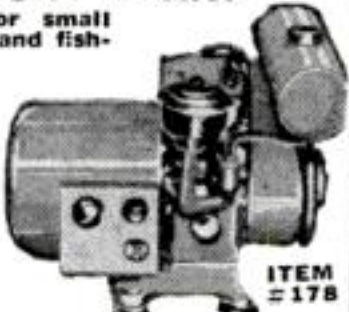
ITEM #115

USE FOR: • Reamer Drives •
Midget Cars • Feed Mills • Can-
ning Machines • Conveyors •
Lathes • Milling Machines •
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• Garden Tractors • Pumps
Variable output speeds from
0 to input speed available by
moving control handle. Lock-
ing handle maintains setting.
Use input power of 1/2 to 1 1/2
H.P. This Westinghouse-Oil
Gear Unit consists of a vari-
able displacement hydraulic
pump feeding a fixed displacement
hydraulic motor. Adjustable relief
valves set at factory for 100 inch
pounds of torque may be reset up to
180 inch pounds. Independent reverse
control allows full output power and speed selection in either
direction of rotation. Shafts measure 3/8" diam., include keyway.
Input rotation is counter-clockwise facing shaft. Recommended in-
put speed not to exceed 750 R.P.M. Over-all dimensions, 7 1/2"x
7 1/2"x11 1/2". Gov't. acquisition cost \$428.00. Ship. wt.
31 lbs. Complete with 2 qts. of oil and full in-
structions. F.O.B. Chicago. **54.50**

NOW... SAVE \$161.00 on this \$250.00 VALUE 350 WATT A.C. PORTABLE ELECTRIC LIGHT PLANT

Compact Electric Plant suited for small
homes, cabins, campers, hunting and fish-
ing camps, trailers and small
electrical home appliances.
Operating costs: About 5c per hour.
Runs exceedingly quiet. Sturdily con-
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ported in trunk of car.

350 Watt—110 Volt—60 Cycle—A.C.
Model—M.S. 35-3, made by Midco
Mfg. Co. 1 Cylinder, 4 Cycle Engine
complete with muffler, starting rope
and oil bath air cleaner, direct cou-
pled to a 350 Watt Generator with voltage control rheostat and
twin outlets. Engine speed 1800 R.P.M. Shipping weight 116 lbs.
COMMERCIAL LIST PRICE \$250.00. F.O.B. Chicago
NOW, ONLY **89.00**



ITEM
#178

A.C. ELECTRIC GENERATOR

Power these electric generators with your own gasoline en-
gine, power take-off, or electric motor, and save the difference.
ITEM #G-3—3000 Watts, 120 Volt, 60 Cycle, 1200 R.P.M. single and
three phase. For two or three wire circuits. Excellent source of elec-
tricity for portable or stand-by use for homes, farms, hatcheries,
radio stations, factories. Built by Hobart Mfg. Co. to exacting speci-
fications of the U. S. Army. Ball-bearing, generator, fan cooled.
Equipped with standard 1 1/2" shaft with keyway for direct or pulley
drive. Built-in Self-Exciter Foot Mounted.
Gov't. Acquisition Cost: \$375.00. Dim. 21"x
13" Dia. Ship. wt. 290 lbs. New Low Price: **155.00** F.O.B. Chicago



ITEM
#G-75

Gov't. Acquisition Cost: \$545.00. F.O.B. Chicago
Dim. 34" x 11 1/2". Ship. wt. 420 lbs. **269.00**
Price Slashed To...

ITEM #G-75—7500 Watts, 120
Volt, 60 Cycle, 1800 R.P.M.
single and three phase current.
for 2 or 3 wire circuits electric
generator, double ball-bearing
construction, standard 1 1/2"
shaft with keyway, and included at
no extra price, 5-groove six inch
pulley for belt drive. Direct con-
nected Self-Exciter Foot Mounted.

PUROLATOR OIL FILTER



ITEM #70—A perfect per-
manent element oil filter
to keep your motor oil or
hydraulic fluid clean at
all times. Protect your
pump or engine with this
unit. Just turn the handle
and the element is clean.
Standard 3/8" inlet and
outlet ports accommodate
16 gallons per minute.
Shipping weight 4 lbs.
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BRAND NEW — BERRY — HEAVY DUTY HYDRAULIC PUMP OR MOTOR

ITEM #166—use on farm equip-
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balanced cam design assures high
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as a pump: delivers 11 G.P.M.,
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as a HYDRAULIC MOTOR: Rated up
to 12 H.P., up to
2400 R.P.M. Stand-
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ports, 3/4" shaft
with keyway. Di-
mensions: 14 1/2"x
8"x7". Weight 63
lbs. Regular price
today \$212.00. Our
money saving price
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2 for 110.00. Each **59.50**



FOUR-WAY, OPEN CENTER CONTROL VALVE

with built-in adjustable relief valve.
Factory set at 1000 P.S.I., spring
loaded neutral position, for use with
one double acting cylinder. In neu-
tral position cylinder is locked and
pump unloaded. Fully
balanced plunger type,
smooth, positive,
easy operation. Can
be used as single unit
or mounted in series
of any combinations
desired. Has 3/4" pipe
thread inlet and out-
let, 1/2" pipe thread
cylinder ports. Newly
manufactured to our
specifications. Ship.
wt. 8 1/4 lbs. An out-
standing buy! F.O.B.
Chicago **21.50**



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#126

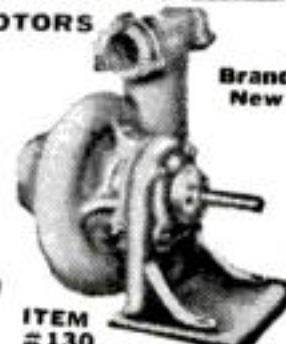
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cylinder, 1 1/2" bore, 26" stroke. Will
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GENERAL MOTORS
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200
GALLONS
Per Minute

- For Draining
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- Fire Fighting
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Brand
New

Swimming Pools • Home Water
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For high volume commercial, home
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pipe thread inlet, twin 1 1/4" pipe
thread outlets. Ball bearing support-
ed 3/4" shaft. Easy priming. Rotat-
ion, counter-clockwise facing shaft.
Gov't. acq. cost \$145.00. Complete
with full instructions.
Ship. wt. 35 lbs.
F.O.B. Chicago **39.50**
Will deliver 200 gals. per min.
against 65 ft. head using 5.2 H.P.
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BLONDER-TONGUE LABORATORIES, INC.
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Manufacturers of TV Boosters, Converters,
and Originators of the
B-T 'Add-A-Unit' Master TV System

Wonderful Road We Never Finished

[Continued from page 102]

But the majestic sights beyond this point seem likely to be hidden from you for a long while.

Costa Rica can't close this gap alone. She needs U. S. help. And with economy the watchword in Washington, that help seems certain to be a long time coming.

Exasperating as it is to think that you've spent \$51,000,000 to be able to drive to Panama and still can't do it, don't think that the money has been thrown away.

Road Has Raised Living Standards

The U. S. national income, according to E. W. James, recently retired chief of the Inter-American Regional Office of the Bureau of Public Roads, has already gained more from the building of the completed stretches of the road than was ever taken out of it to build them. That is because improvements in local standards of living—producing more and more money to spend for U. S. goods—have followed the course of the road.

The only trouble is, you didn't get what you paid for, and it begins to look as if you never will.

Given \$16,400,000 and political approval, the Guatemalan gap could be closed in from 18 months to two years, the Costa Rican gap in about three years. That, again, is according to Mr. James, who headed the Bureau of Public Roads' participation in the project from the day the route began to be laid out, in 1930.

Then, starting either at Laredo, Tex., or Nogales, N. Mex., you'd be able to load the wife and kids in the car and show them more than 3,000 of the loveliest miles on earth.

END

Tough Pose

LITTLE WILLIE dashed breathlessly into the drugstore.

"Quick!" he panted. "My father's hanging by his pants from a spiked fence."

"What can I do?" asked the druggist.

"Put a new roll of film in my camera," said Willie.—*Pure Oil News*.

If you can drive a nail you can install beautiful hardwood paneling like this

Visit your local lumber dealer now! Let him show you how you can enjoy the warmth and beauty of *real* wood paneling at a cost you wouldn't think possible.

Choose from rich looking mahogany, oak, birch, Korina,[®] knotty pine and many others. Start this week end—you need no special skill.

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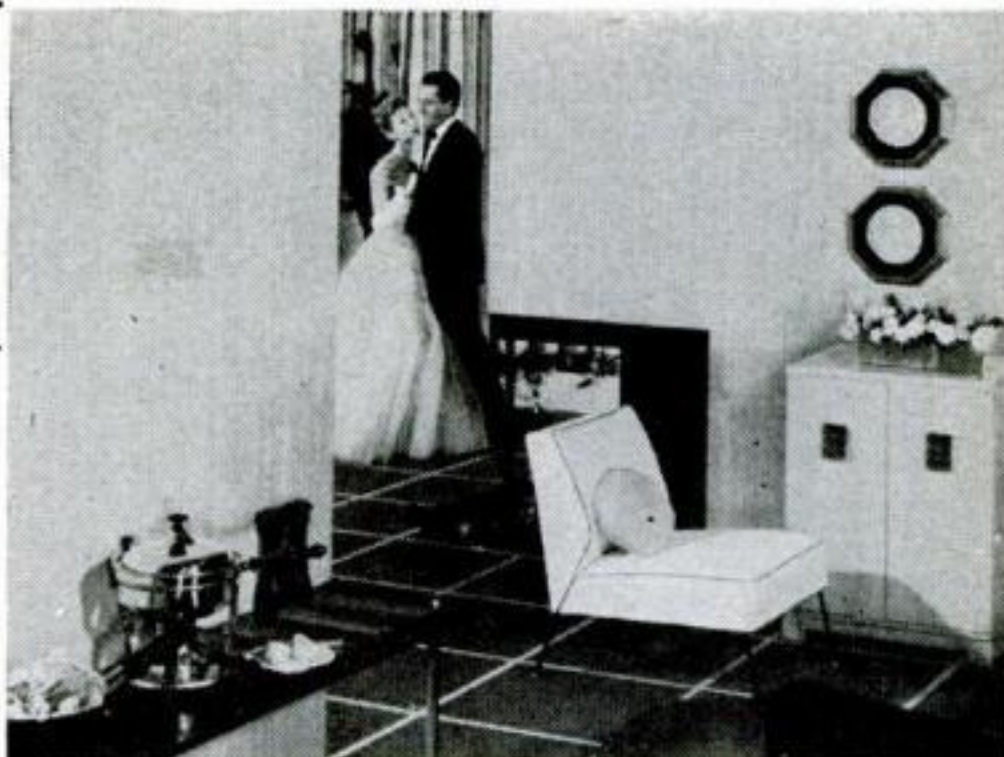
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United States Plywood Corporation

World's Largest Plywood Organization

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U.S.-Mengel Plywoods, Inc., Louisville, Ky.



KORINA[®] the beautiful blond hardwood from our plant in the Belgian Congo. Costs only \$80.64 for a 16' x 8' wall. Other Weldwood hardwood paneling (birch) as low as \$11.00 per 4' x 7' panel.

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Please send 20-page, full-color book with 32 ideas for "Beautiful Homes—with Weldwood". Enclosed is 10¢.

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Exclusive GIL-BILT Build-It-Yourself Features

- No machining—build easily with hand tools only
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- Sturdy wood, aluminum and steel construction
- Capacity and performance of commercial saws selling for \$60 and up
- Proved performance. Nationally advertised and sold for 6 years. Satisfied customers around the world.

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GIL-BILT[®]
PARTS
KITS

PLANS
only
\$1.00
EACH
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GIL-BILT 10-in. TILT/ARBOR SAW



- 27x28 in. table, 13½ in. capacity in front of blade
- 10 in. blade cuts 3¼ in. deep, tilts full 45 degrees
- Floor model 34" high, table always stays level

- New Departure ball bearing arbor, ¾" precision shaft turned down for ¾" bore blades, alum. housing, shipped ready to run.
- Jackscrew and 4½ in. dia. handwheel lowers and raises blade
- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jackscrew mechanism and handwheel, and all other metal parts (less blade).....\$22.95
Same Kit with 10" Combination Blade \$25.90
Same Kit with 8" Combination Blade \$24.90

GIL-BILT 12-INCH BAND SAW



- Cuts to center of 24 inch circle
- Handles stock up to 6 inches thick
- 18x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two ¾" bore Oilite Bronze bearings
- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled
- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rigid cast aluminum wheels fully machined ready-to-install. Heavy rubber tires
- Uses standard 78 inch blades up to ¾ in. wide
- Fully enclosed mechanism for utmost safety

GIL-BILT Metal Parts Kit includes Plans, rubber tires, aluminum wheels, ¼ in. blade, ball bearing spindle, tilt mechanism, blade guides, table tilt segments, and all other metal parts.....\$23.95
Return Kits in 10 days for refund if not satisfied.
For shipments up to 600 miles, add 5%; over 600 add 10%. Amount in excess of actual postage will be refunded.
Order Kit now, or order Plans at \$1.00 each and Kit later less cost of plans. Write for **FREE** Catalog.
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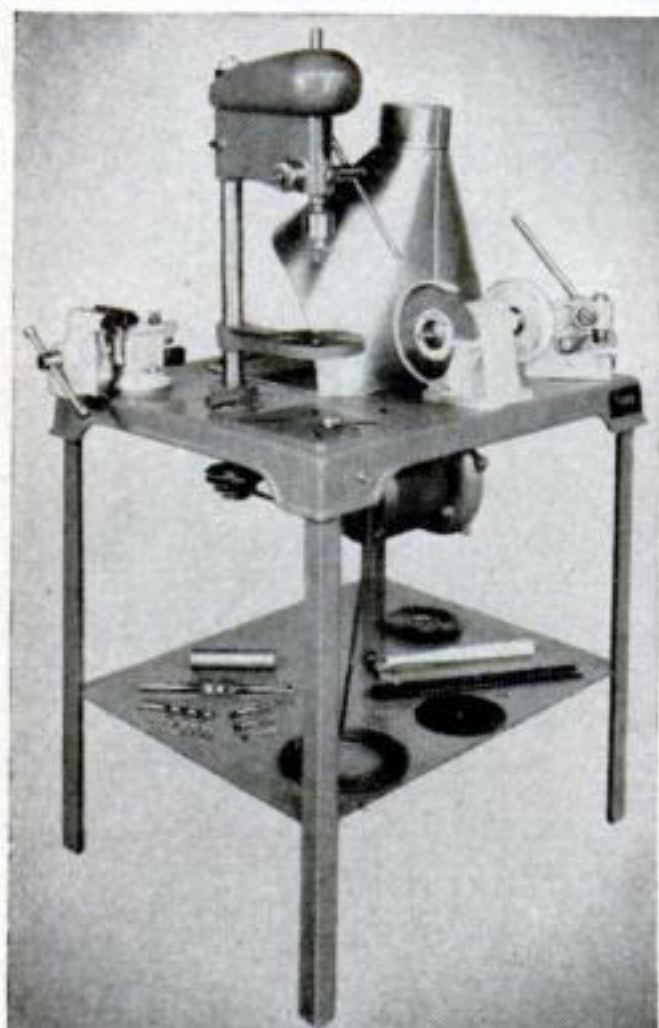
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Ready
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Use!**

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Ship. Wt. 240 lbs.

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**Works Iron, Sheet Metal,
Aluminum, Brass for**

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Estates, Repair Shops, etc.**

Includes: 1/3 h.p. Motor; 15" x 20" Forge with air blast regulator; electric blower; 3 1/2" machinists vise; 14" two speed radial bench drill press; Grinder & Polisher with emery, cut-off, polishing and wire wheels; 3" lever operated Shear; Hammer; Fire Tong; Tap Wrench; Set of 1/4", 3/8", 1/2" taps and drill bits to match; 1/2" steel burr; complete assembly & instruction book.

**Make your own furniture, signs,
railings, trellises, repairs, etc.**

See the **FORGE SHOP** today at your hardware store or Hobby Shop—OR write for Free Catalog to Champion Blower & Forge Co., Dept. S, Lancaster, Penna.

Name _____

Street _____

City _____

State _____

They Test Cooking in a Glass Stomach [Continued from page 107]

Ought we to eat our vegetables raw? "No," replies Dr. Horn, "but if you want to conserve their protein values, cook them with as little heat as possible. Cut down the cooking time if you can, but cutting down the degree of heat is 10 times as important." Dr. Horn suspects that the ideal cooking method, which he hasn't yet tested, will turn out to be electronic.

Now what? Since Horn is a scientist, his main job at the moment is to write a scientific paper explaining the Beltsville method in such detail that other scientists can put it to work. Inquiries about it, prompted by a Department of Agriculture announcement, have already come in from nutrition authorities in food-processing companies and universities. The Army, too, has shown interest.

Canned Food to Be Tested

After that, Horn wants to complete the studies on fresh food, raw and cooked, and then get to work on food that's been stored or canned. There is some evidence that the longer a food is kept, the more of its amino acids are lost; Horn wants to check on that.

One of these days, the Beltsville group expects to help nutritionists draw up a chart showing the amino-acid content of all main foods—fresh and processed, raw and cooked. Then it will be easier for you to balance your proteins. And if anyone wants to use the glass-stomach method to test the protein quality of converted sawdust, cultivated algae, or anything else that might ease world food shortages, he is welcome. **END**

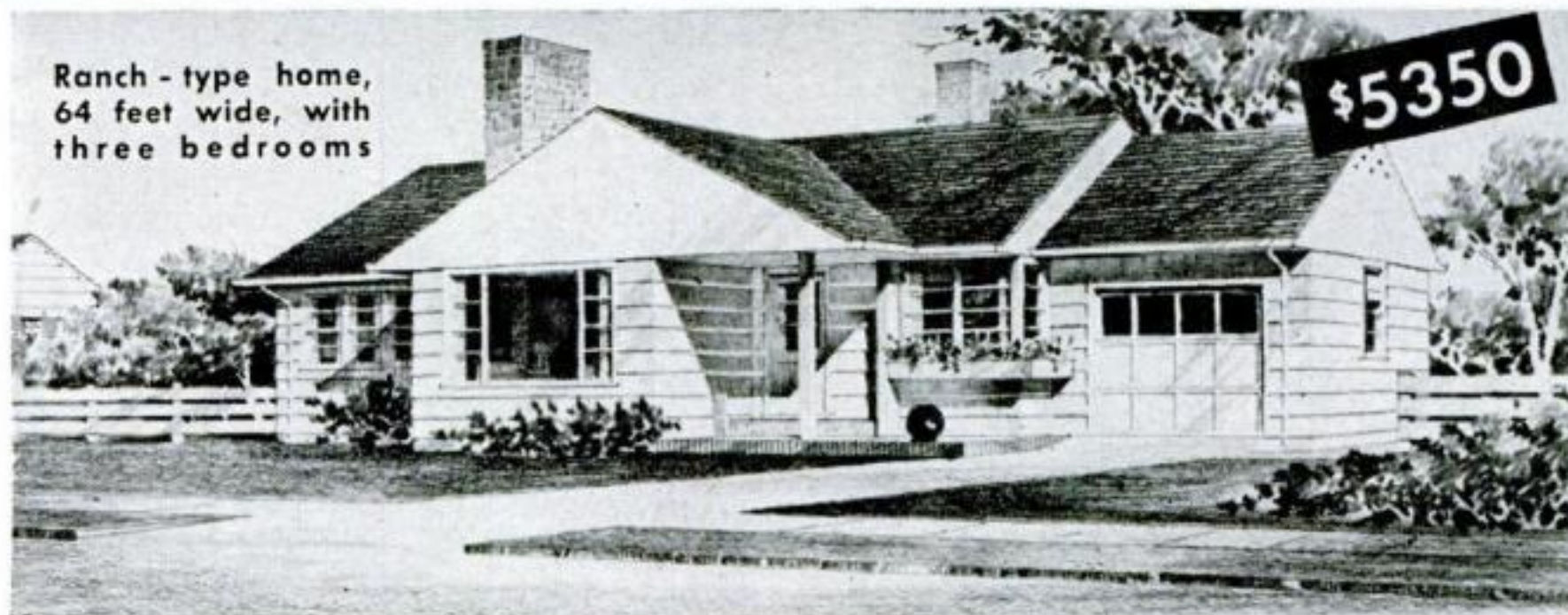
It Gets Around

Mrs. BROWN was complaining to her doctor that the bill was too high.

"Don't forget," he reminded her, "that I made 11 visits to your home when little Johnnie had the measles."

"And don't you forget," she countered, "that he infected his whole class."—*Fireman's Fund Record*.

See How Little It Costs to Build a Ready-Cut Liberty Home



Ranch - type home,
64 feet wide, with
three bedrooms

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—Recommended for Hobby and Home work. Comes as illustrated above. Plugs into any 110 Volt AC or DC Line. Amperage Output is 50 to 70 Amps. Size: 11" deep, 6 1/2" high, 13" wide. Shipping Weight 45 lbs. Price F.O.B. Chicago, Ill. Less Accessories **\$49.95**. Complete with Accessories **\$54.75**. Fast Battery Charger Attachment **\$5.00** Extra.

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TODAY

Scientists Tackle Pilots' Blind Spots

[Continued from page 118]

silver, which blend in with the surroundings and are hard to see.

The use of rear-vision periscopes also is now being tested in jet fighters by the Air Force and the results are being eagerly studied by commercial and other civil aircraft owners. In England, the rear-vision periscope, extending up out of the forward part of the cockpit cabin, is already in use on many commercial transport planes.

General cockpit design likewise is getting a going-over by a special industry-wide committee under the sponsorship of the Society of Automotive Engineers. Standard cockpit designs are being drawn up with the positions of the basic flight instruments and major controls so arranged that they require a minimum of eye and arm movement on the part of the pilot. According to the general standardization plans, each basic instrument will be placed in exactly the same position in all airplanes of a general type.

Flying Regulations to Be More Rigid

More important, the Government's air-safety experts are drafting a threatened stiffening of flying regulations to cut down the likelihood of mid-air collisions. "Unexplained" and inexcusable in-flight crashes like the one that occurred last summer over Indiana must stop, they warn, and they're ready to crack down on private fliers and airlines alike.

The 57 passengers in the Indiana "brush" collision were just lucky. In 34 of the 86 in-flight collisions during the last five years, 175 other people weren't so lucky. They were killed. **END**

Too Easy

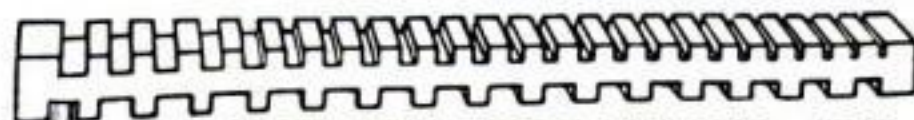
A COUPLE with a new baby and a toddler were listening to a television salesman enthuse over a new model "... and it's so simple a baby can turn it on."

That was the clincher for the husband, who remarked to his wife, "Guess we'd better wait till they make them more complicated."—*Indiana Tele News.*

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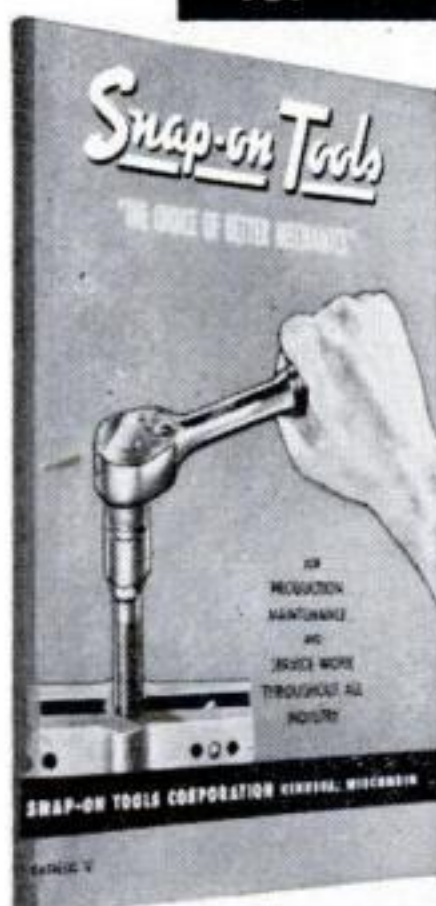
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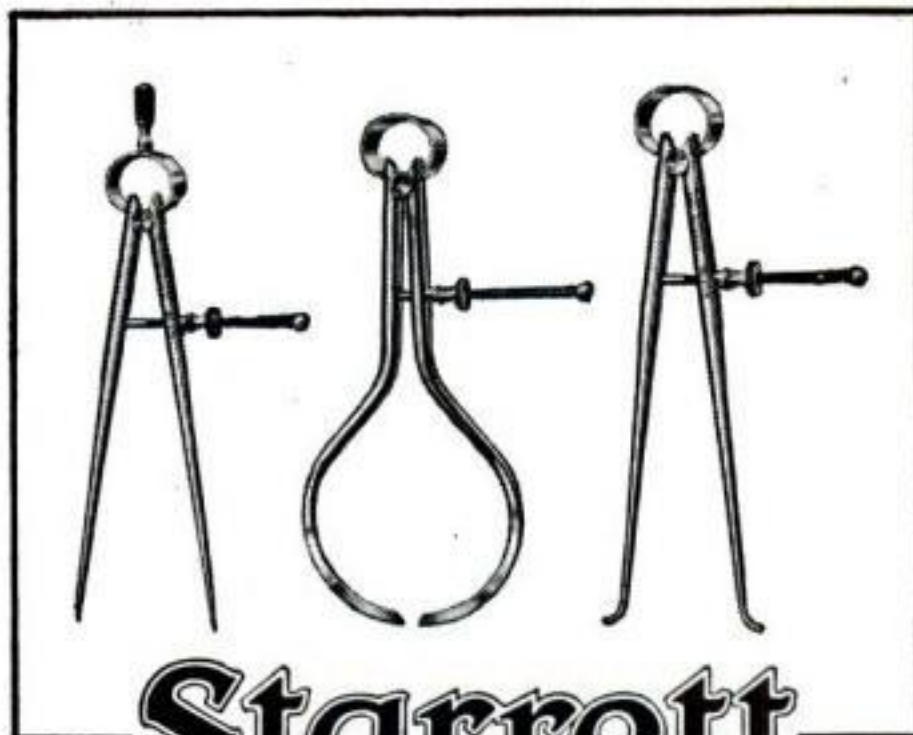
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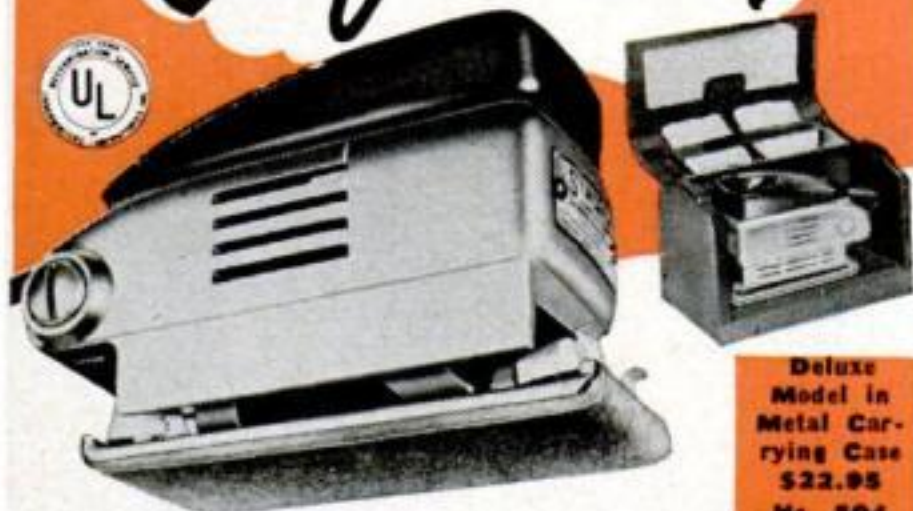
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JANUARY 1954 261

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[Continued from page 126]

er's attention. They must also compete with *chi-chi* models like hardtops and with various lines or "series." As among the brands, decision has to be made on the kind of fishtails on the rear fenders and wind-splits on the front ones. The number of choices that has to be made before the money and the car change hands is getting so huge that the emotionally unstable buyer had best stay out on the sidewalk, point through the window and settle it by saying, "Gimme that one."

Sorry, No Agnes Pink

Chevrolet won't be making any Agnes Pink automobiles in 1954. It won't even change its basic sheet metal from 1953. But the cars will get away from a light faster and—a point vital to the fellow who is fiddling with the notion of buying a new car—they will look different.

Engine power is up. Compression ratio is up. A new camshaft has been installed. Power plants are quieter. Carburetors are changed for smoother acceleration. There's a new muffler and nylon inserts for the rear springs, eliminating the need for spring covers and for lubrication.

Power brakes will also be available for 1954. They are the low-pedal type, made by Bendix.

You Pays Your Money . . .

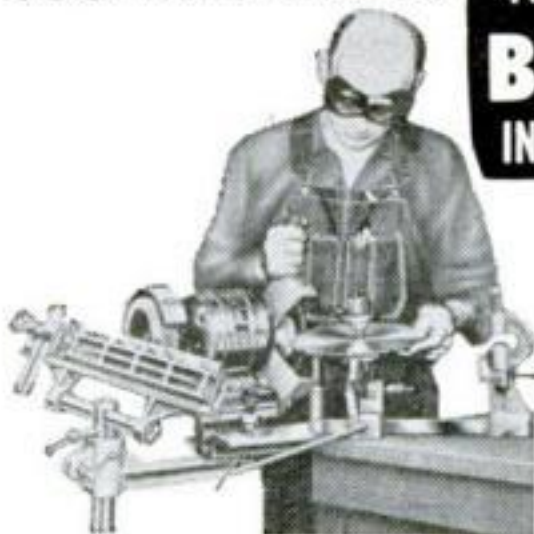
And colors! Nine of the 14 exterior colors are spanking new. So go down to the showroom and make your choices: Solid color? Two-tone? Hardtop? Sedan? Station wagon? What line, the Bel Air? What transmission, a standard or automatic? What tires, plain or whitewall? Want power steering? An electric front-seat adjustment? Automatic window lifts? Wheel covers? Turn signals? Backup lights? Or perhaps a station-seeking radio?

On second thought, you'd better make out a check list and sit down and talk it over with the little woman. It will save you trouble.

END

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Educated Gas Pedal Keeps Cops Away

[Continued from page 169]

his position often, and permits him to concentrate wholly on steering,

A less important criticism turns on the fact that most drivers, while running on automatic, tend to postpone unlatching it until the last moment. As you close up on a slightly slower-moving car ahead, you postpone touching the brake on the hope that he'll turn off the road or pick up speed, sparing you the trivial chore of unlatching and latching up again. A single medium-sized scare corrects this tendency.

How much? Pierce Governor doesn't know, at this writing, but hopes to "come near the price of a good auto radio." Presumably this means under \$100, but not by much. One reason for the uncertainty is that the company plans to sell the device to car manufacturers, for use as a factory-installed extra, rather than directly to you, with all your headachy installation problems. Several makers are reported to be dallying with Speed-o-Stat.

The device will probably come in several versions. Besides the one described here, there may be a model without automatic speed-holding—it'll give you a firmed-up accelerator but won't latch in. A third type will appeal to the fathers of kinds having a taste for speed: Pop will be able to set maximum speed by key.

Considering that Junior would be smart enough, in many cases, to drive off docilely and stop under a lamppost down the street to pull off a vacuum hose, Pierce knows that Junior-proofing will take redesign. But by using lead seals, they figure they can make it so Pop can always tell if Junior jumps it. **END**

Admonishment

A FRIEND reports that a few evenings ago, in a traffic snarl, one of the inevitable horn-tooters began blasting his horn.

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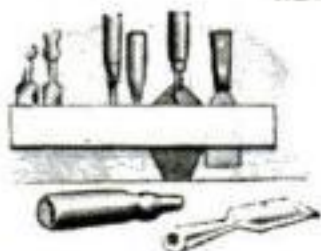
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- Car Altimeter, 0-10,000' (Taylor)...\$9.00
- Wrist Watch, 17-jew, "Executive" Genuine Enicar, Specify Man's or Lady's...\$18.15
- Engnr. Stop Watch, precision 1/10 sec...\$12.95
- Inspection Magnifier, 2"x4" lens...\$2.89
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Fill tires... spray liquids



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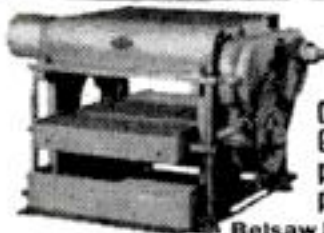
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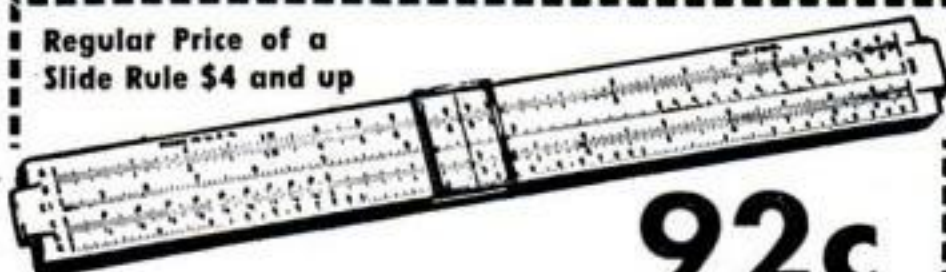
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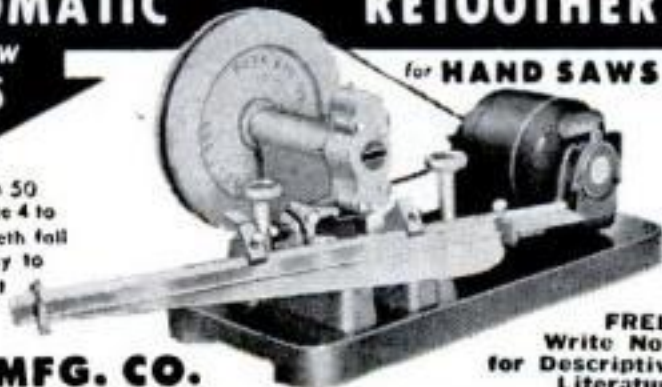
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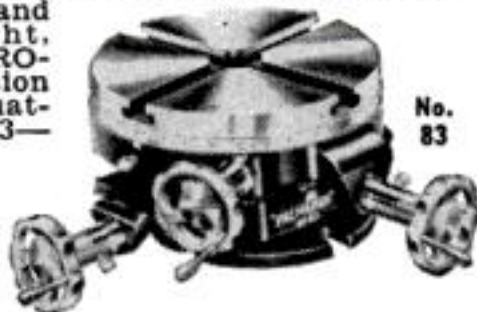
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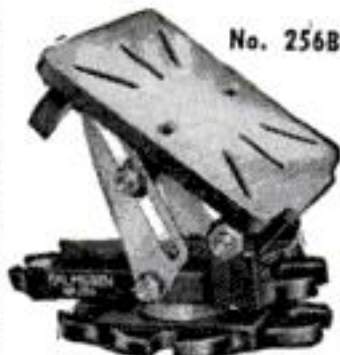
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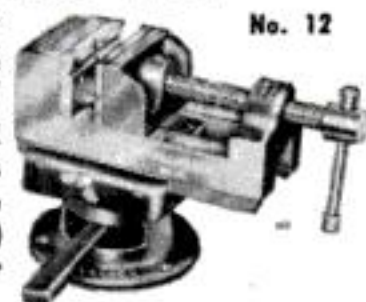


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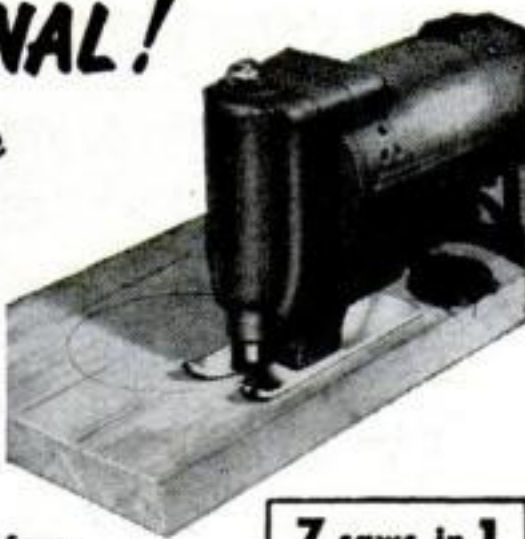
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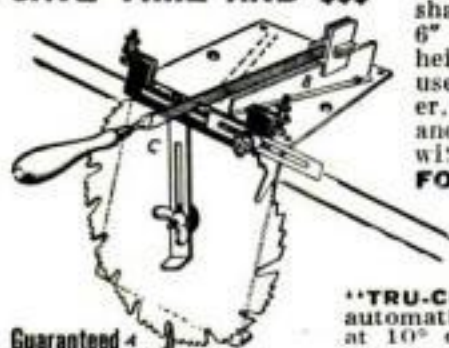


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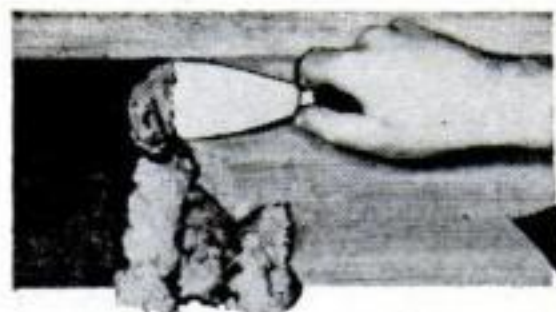
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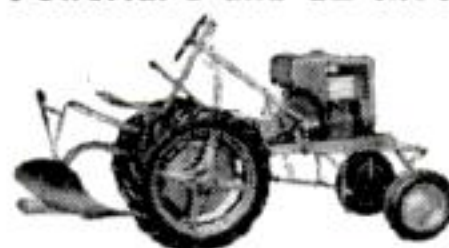
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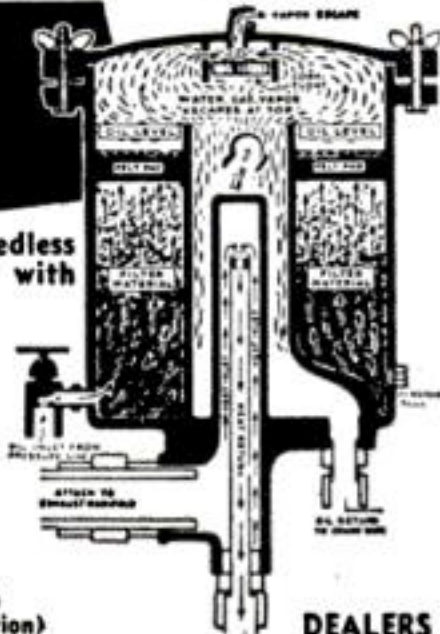
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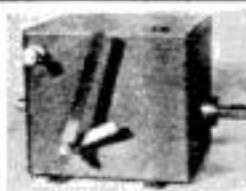
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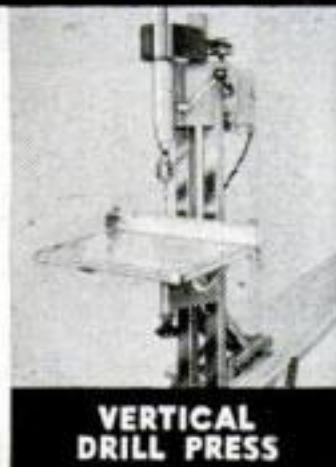
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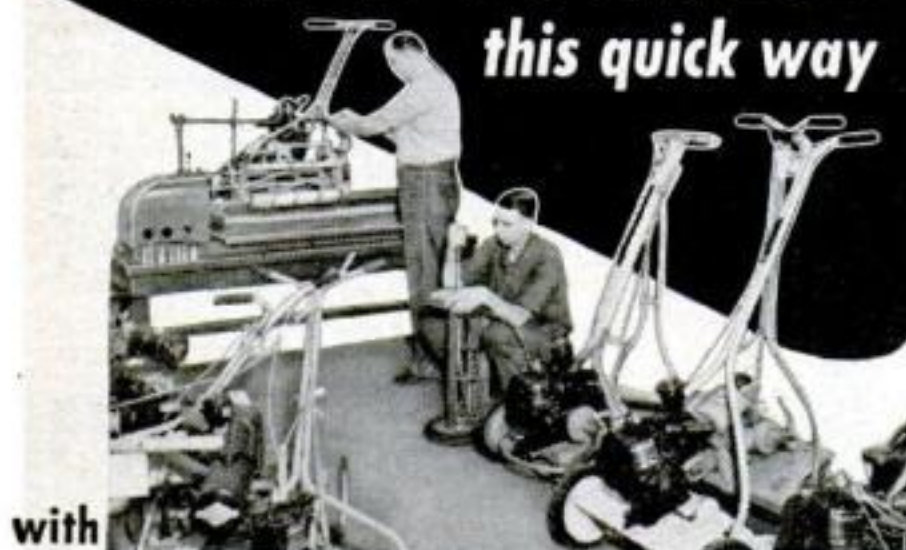
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"I have taken in 100 mowers in 5 weeks since I got my
Foley,—with no advertising," says George C. Wise. "In
two months I have sharpened 155 hand mowers, 6 power
mowers and 1 trimmer. My machine has paid for itself
and everything I take in now is all profit"—from Otis
Zacharia.

Here's a business you can start in spare time, and begin
to make a CASH PROFIT right away. The Foley handles
up to 3 or 4 mowers per hour, and prices run \$1.50 to
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FREE—VALUABLE ILLUSTRATED BOOK shows
how to sharpen power mowers. Foley prices
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profits. Mail coupon today—we'll also send FREE PLAN
telling how to start your own business without previous
experience. No salesman will call.

FOLEY MFG. CO.,
108-4 Foley Bldg., Minneapolis 18, Minn.

Send FREE BOOK "How to Sharpen Power Mowers,"
and FREE PLAN on lawn mower business.

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WIZARD WITH WOOD



For a blond or pickled finish use

WHITE FIRZITE®

Produces magical "woody" effects on ply-
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Write for leaflet P18—UNITED STATES PLYWOOD CORP., NEW YORK 36, N. Y.

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Post-Paid

For grinding on plastic,
wood, soft and hard
metals. Regular List
Value \$8.40.

12 MTD. WHEELS ON
1/4" SHANK \$3.60

18 MOUNTED POINTS ON 3/32" SHANK.....\$2.50

75 PIECES



For cut-
ting and
grinding
on wood.
\$4.50

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metal or plastic. Includes 26 mtd. wheels and points
on 3/32" shanks; 24 miniature cutters on 3/32"
shanks; 25 short shank min. cutters. Will fit all electric drills
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SCHUPACK SUPPLY CO., 7331 Cottage Grove, Dept. PS-5
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NEW 1954 Illustrated Catalog 10c

ONE-MAN SAWMILL LOW \$50.00 AS... \$50.00 DOWN



Take BELSAW Portable Sawmill right to the trees—turn out valu-
able lumber for home and farm—sell to local yards—make
up to \$50 a day custom sawing for neighbors. BELSAW
lasts a lifetime. No crew needed. Power with tractor
or auto engine. Beginners get excellent results. Send today
for FREE BOOK, "HOW TO MAKE LUMBER".

BELSAW MACHINERY CO.
8465 Field Bldg. Kansas City 11, Missouri



MAKE YOUR OWN FOUNTAINS, LAKES, RIVERS, WINDOW DISPLAYS

With New Miniature Water Pump

Here's real action for window displays. Xmas
tree layouts, or the home lab. Pump only 4 3/4" high
—3 1/4" wide. Threaded for pipe, or uses 3/8" rubber
tubing. Operates in 1" of water. 110 A.C. 60 Cycle.
1/250th H.P. Furnished complete—
ready to work—your satisfaction abso-
lutely guaranteed or your money back.

\$9.95 p.p.

Moore Manufacturing Company, Swedesboro 16, N.J.

ALLEN 1-TON POWER BENCH TYPE PUNCH PRESS



A RUGGED, RELIABLE PRESS FOR SMALL WORK

Cuts cost and saves money on
stamping, forming, drawing, etc.

Overall height—17 1/2"

Base size—8 1/2" x 8 1/2"

Die bed—5 1/2" x 8 1/2"

Ram face—1 1/2" x 3 1/2"

Ram stroke—3/4"

Positive 3/4" ram adjustment.

Sturdy, single pin, non-repeat hand
lever clutch. V-belt drive. Total
weight 105 lbs.

30-DAY MONEY-BACK GUARANTEE

Full year warranty against defects. Send your order
today. Price \$125.00 f.o.b., Clinton, Mo. (Includes
motor bracket, V-belt, motor pulley, less motor).

Alva F. Allen, Dept. PS, Clinton, Mo.

This One



T6EH-4EG-8PEC

NEW 100-200-300 POWER 'HYPOWER' MICROSCOPE



A VALUE UNSURPASSED ANYWHERE! Triple objective revolving lenses allow selection of 100, 200 or 300 power magnification. Has built-in micro adjustment. Adjustable sub-stage mirror. Body is made to incline through 90°. Complete in dovetailed hardwood case. Ideal for student, lab, study of insects, etc.

SPECIAL 9.99

BARGAIN HOBBY MOTOR



Here's a real value for the hobbyist or home mechanic. This powerful little motor turns 2500 to 3600 RPM.

Has a double-end shaft fitted with an arbor for mounting small stones, wheels, buffers, etc. and a hand chuck for 3/32" and 1/8" shanks. **MOTOR complete with arbor & chuck --- 3.99**

FLEXIBLE DRIVE-SHAFT for HOBBY MOTOR 36 inches long and complete with necessary adapters to take, grinding, buffing, polishing, wheel, etc. Shaft is 7/32" dia. Makes this motor a very versatile bench tool. **2.99**



ARMY SURPLUS TOOL BOX

Made of finest Chest Steel. Reinforced corners. Welded piano hinge. Roomy lift-out tray. Leather handle. Size: 16" x 7" x 7". A \$6.95 VALUE! **ONLY 2.75**

FAMOUS SURPLUS MIXES



Another Palley Bargain Mix. 24 assorted hose clamps of various sizes & types. Ideal for use on autos, trucks, tractors, boats, planes, pumps, etc. All are finest, aircraft quality. Be Prepared. **2.89**

GADGET MIX - Another SURPLUS BARGAIN! This amazing mix includes a 'TREASURE' of small parts such as: Cogs, Worm Gears, Wheel Bearings, Rivets, Spacers, Bolts, Screws, Springs and Clamps. 5 pounds for **ONLY 1.19**

NAVY OCTANT



Made for the U.S. Navy by the Pioneer Instrument Co. Type Mark 4. Designed for use in aerial navigation. May also be used on land or ocean. Has artificial horizon, dual prism, 4 filters, astigmatizer lens and many other valuable parts. The parts alone are worth many times the price.

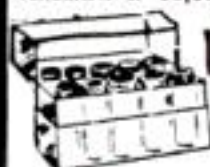
Will give accurate calculations in sighting Sun, Moon and Stars. In original hardwood case

37.50

MARCHING COMPASS

Lensatic type. An all-purpose precision instrument for surveyors, hunters, sportsmen, boy scouts, hikers, etc. Can be used for map orientation, taking azimuth reading or as a guide in unfamiliar terrain.

The bezel ring is marked in 3° notches for computation and rotates through 360 degrees. Has a special "peep" sight and hair-line guide in lid for taking a bearing on a distant landmark or object.



CHEMISTRY SET

Made for Army Chemical Warfare Division for testing water hardness, purity, etc. A handy addition to the chemistry lab or an exciting experiment kit for

the amateur. Set includes test tubes, complete instructions & 13 other items. Complete in Lucite box with cover. . . .

1.89

Palley SURPLUS & NEW MERCHANDISE - SAVE!



9 PIECE DRAWING SET

Suitable for the architect, student, draftsman, artist, etc. Contains 9 separate pieces including: one 5 1/2" divider, one each: - 3/16" bow divider, bow pencil & bow pen with wheel adjustment & revers-

ible needle point; one 4/16" ruling pen with extra handle; capsule of extra leads. All in a 2 flap, velvet lined pocket book case **ONLY 5.98**

AIR CORPS SURPLUS PLASTIC PARALLEL RULER

Heavy durable plastic with guide knobs on top and rubber pads on bottom to prevent slipping. Has beveled edges for pen & pencil use. **98¢**

NEW BERNZ-O-MATIC TORCH

Makes the old "blow-torch" obsolete. Here is a self-contained fuel & burner unit that does a job where intense heat from a concentrated flame is needed. Absolutely SAFE! (ICC approved). High quality steel - lightweight - replaceable fuel cyl.

PENCIL FLAME TYPE - with hour cylinder & (1) burner unit - ONLY 6.95

EXTRA FUEL CYLINDERS 1.95

NEW 7 to 1 HANDY HOIST

Strongest hoist for its weight on the market. Will LIFT 1000 lbs. but weighs only 1 lb. Handy at home, on farm, in shop, etc. Consists of 2 pulley blocks, 100 feet of Nylon Cord, 2 Nylon slings and canvas bag. Easy to pack and carry. Ideal as hunters game hoist. **12.50**

NEW POCKET HAND WARMER

Maintains a temperature up to 120° by radiation. Heats from 16 to 24 hours without re-filling. Uses cigarette lighter fluid or white gasoline. Absolutely Safe! Metal case. Extra Heating Elements for above - 2 for 75¢

SURPLUS TANK SCOPE



A very popular, inexpensive telescope. Easily sighted with formed face piece. All brass construction. FULL 20 POWER. **8.95**

ARMY RIFLE SCOPE

Built to rigid Gov't specifications. Contains the finest precision, Achromatic optics. Has five double-element lenses, fully corrected for color and spherical aberration. 3 power magnification. Dat reticle. Length 9". **9.95**

AVIATORS (AN-6530) WINDPROOF GOGGLES Genuine ARMY AVIATORS TYPE. Have interchangeable, precision ground lenses. Your choice of three lens colors - Clear, Amber or Green. Metal frames are rubber covered with a soft, chamois lining and have built-in, non-fogging breathers. Also has adjustable nose bar. **2.95**

EXTRA LENSES - Choice of three above colors. Per PAIR ONLY 1.35



BRITISH MARK III FIELD TELEPHONE SOUND POWERED HAND SET

Another Special Palley Value! May be used home-to-garage, house-to-barn, office-to-shop,

etc. NO BATTERIES ARE NECESSARY - entire unit is powered by the sound of your

voice. Ringing circuit is the same as the popular EE8 type. Effective to 1/2 mile range. May be used with or without metal cases. Set of two **ONLY**



Only 29.95



NEW AIR CORPS TYPE CAP

Special! For the Hunter, Camper, Farmer, etc. All Leather with soft suede lining & sheepskin lined, **2.59**

turn-down ear flaps. Long, leather covered visor. Small, Med., Large sizes. . . .

LEATHER MITTENS

Sheepskin lined with leather outer cover. Ideal for all types of winter work. Sizes small, medium & large. . . . **ONLY 2.69**



GENUINE U.S. NAVY SHEEPLINED FLIGHT BOOTS

Only 10.88 PR.

22.00 VALUE

Can be worn with or without shoes. Has genuine leather uppers and rubber lowers. Laces up the back for snug fit. Has double zipper front closure to put on & take off easily. Leak-proof, weather-proof. Soles of heavy NON-SKID tread. The ideal rough weather boot. Sizes: Small, Medium, Large, Ext. Large.

WATERPROOF NON-SKID SHOE PAC

Has 10-inch, sturdy leather uppers and a genuine, all rubber shoe with a felt inner sole. Designed to wear over ordinary shoes. Gives complete protection from water, snow, Used but excellent condition **4.95**

ARMY SURPLUS SKI POLES

Laminated Steel, leather faced. Wrist strap. Also has leather faced snow ring. Metal tip. Length 4 ft. These poles are WORTH 3 TIMES OUR PRICE! **3.95 PR.**

1954 Edition WORLD'S MOST AMAZING BARGAIN CATALOG

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The World's Biggest Devilfish

[Continued from page 164]

and everyone, young and old, grabbed the rope and tried to pull the ray over the sand. No success.

Oil-company trucks came along. The rope was attached to the rear axle of one. Men and truck pulled. Together, they got the ray up a couple of feet on the sand.

The truck looked as if it were about to fall apart. It was detached from the load, and departed.

Logs and lumber were put under the ray. Another truck, plus men, got him up 10 or 15 feet more. The second truck was forced to quit.

A third truck, with everyone in sight also pulling, finally got the ray well up on the beach.

Sea Moves In

Then Migdalski went to work pouring the plaster for his molds.

The tide started coming in. Migdalski realized it would roll over the ray, plaster and all.

"I was ready," he recalls, "to give up for the tenth time.

"But everybody got busy and built a dike of sand around the ray. The dike was three feet high, and completely surrounded him except where it met a high bank at the back. The day, and the ray, were saved."

Laboring under the broiling sun, which he now felt, Migdalski took two and one-half days to make plaster molds of the ray. He got one break. "Despite the sun," he says, "the ray didn't smell." The molds were so large they could not be loaded onto the *Suzanne V* or any of the U.S. fishing vessels in the vicinity. They had to be shipped to Yale aboard a freighter.

For the ray measured 18 and one-half feet across—from wing tip to wing tip.

Biggest Ray to Tip Scales

He weighed over 3,300 pounds—well over one and one-half tons. He was the largest ray ever weighed. He was one of the largest rays ever caught—very

possibly the biggest. Records are being checked.

And the devilfish was not weighed until he had been cut into pieces, and therefore had lost some of his body fluid and had become dehydrated by being out of the water. That means the manta was at least a couple of hundred pounds heavier when Migdalski & Co. were fighting him.

Ray Outshone Other Record Catches

It is interesting to compare this Yale catch with some other big ones. The record white shark, and the biggest catch by any means listed in the *World Almanac*, 2,333 pounds, was taken off South Australia in 1952. The record tuna was 1,800 pounds; the heaviest marlin, around 1,200; the biggest sawfish (which is itself a ray), 1,500; the record swordfish, over 1,000. Only a few catches in history—of such things as the whale shark, the 50-foot-long largest of fishes—are bigger than Yale's.

Migdalski wasn't out after the biggest ray. Didn't want him, in fact.

He wanted a manta small enough so he could catch him, haul him in and mold him with a reasonable amount of work.

But since the afternoon was getting along—it was, you remember, three o'clock when the ray was sighted—expedition leader Wendell Anderson told Migdalski he'd better attack this one or he wouldn't get any.

That was why, although the party had spotted five or six rays that afternoon, Migdalski went after this one but hadn't chased any of the others.

"I thought they were too big," he says, "and turned them down." END

A Meaty Question

A CUSTOMER complained to the waitress that his soup was too watery, his bread too stale, the butter too salty, etc. Finally he said, "And when you order that chop, make it lean."

"Yes, sir," said the girl. "Which way?"—*The Right Hand*.

44 Pc. SOCKET SET



Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome alloy. Absolutely the best. Complete range of 21 sockets from 1/16" thru 1 1/16" (1/16" drive) & 7/16" thru 1 1/16" (1/2" drive). Two extensions, reversible 1/2" ratchet, 3 drift punches, sliding "T" head, all angle coupling, 1/2" speeder, 1/4" breaker, 5 pc. high chrome alloy combination wrench set & 8 pc. offset wrench set in a big dog-house toolbox with ample room for other tools. (Item 596). We challenge anyone to match this value! Easily worth \$49.50. List price \$62.90. **\$21.95** Wt. 16 lbs.

52 Pc. Socket Set (Item 205) contains a complete set of sockets in 1/2" drive, 3/4" drive and 1" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. Beautiful matched chrome thin wall alloy sockets in a sturdy handsome steel box. Wt. 17 lbs. List price \$62.90. **\$27.95** Factory Special

29 Pc. SPEED DRILL SET

Superb, high quality, imported drill sets of chrome vanadium speed steel designed to give superior performance. Normally you would expect to pay much more for these precision made, long-life production drill bits. Perfect for all drilling in steel, cast iron and other metals. Also excellent for wood or plastics. Set of 29 drills from 1/16" to 1 1/2" in an indexed steel box. Wt. 4 lbs. (Item 311d) **\$11.95** Factory Price

RIGHT ANGLE DRIVE and SPEED REDUCER for 1/4 inch Electric Drills

A precision built drive which makes impossible drilling jobs easy and accurate. Ideal for drilling in confined spaces as between joists or shelves. 2 to 1 reduction gear will drill with ease up to 1" holes in wood using 1/4" shank bits. Also converts any electric drill to the proper speeds for power buffing or sanding. Chuck of electric drill is simply unscrewed from shaft and screwed on right angle drive. Can be used in either direction—to increase or decrease speed. Twice speed of drill for sanding metal—half speed of drill for sanding wood or polishing. Item 243. Wt. 1 lb. Special **\$4.95**

HEAVY DUTY RT. ANGLE DRIVE for 1/2" DRILLS. Has 2 to 1 speed ratio. Easily handles large auger bits and will drill up to 3" in wood. Ideal for plumbers—drilling for pipe installations in confined places—or electricians drilling between joists. Attaches directly to any electric drill with 1 1/2"-20 threaded spindles. Precision cut gears; main and rear bearings on each spindle to assure perfect alignment. Item 308. **\$19.95** Wt. 2 lbs.

HEATING & VENTILATING FAN

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range removes kitchen smoke and odors. Powerful continuous duty motor. 10-120 V. A.C. Mount in wall or ceiling to ventilate any area. Quiet, super efficient fan moves huge volume of air. (400 to 600 c.f.m.)

8" Fan, wt. 5 lb. **\$6.85**
9" Fan, wt. 6 lb. **\$7.85**
10" Fan, wt. 7 lb. **\$8.85**
12" Fan, wt. 8 lb. **\$9.85**

HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. Item 10E **\$11.95**. 12" Fan, wt. 10 lbs. Item 10D **\$12.95**

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SAVE MIDDLEMAN'S PROFITS

PORTABLE LIGHT PLANTS



PUSH BUTTON START A.C. LIGHT PLANT 600-700 watts—115 v.—60 cyc. A.C. Powered by a rugged 2 hp. easy-starting Briggs gas engine. No wiring necessary, just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for Civil Defense, Fire Depts., trailers and camps. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. Item 24. Wt. 75 lbs. *Be prepared if war or storm knocks out power lines.* Reg. \$275 value. **\$143.50**

700-800 Watt Plant (Item 24) same as Item 24 but larger engine. **\$169.95**

1500-1700 Watt Plant (Item 20) — Similar to Item 24, but has three times more capacity. Wt. 173 lbs. **\$279.50** Factory price.

GIANT 2000-2500 WATT PLANT 110-120 V. 60 cyc. A.C. Absolutely the best made—exclusive dynamically balanced armature; heavy windings develop up to 5000 watt overload for motor starting. Skid-mounted—portable. Powered by easy starting Briggs or 6 hp. Wisconsin engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty and complete instructions included. (Item 31) Wt. 210 lbs. Reg. price \$585.00. Special at **\$299.50** Generator only and control box. **\$169.50**

3000-3500 WATT PLANT (Item 198) 110-220 v. 60 cyc. A.C. Belt drive Wis. Engine. Push button start. Wt. 370 lbs. Heavy duty **\$399.50** Generator only for belt drive, Wt. 115 lbs. (Item 198A) **\$239.50**

MASTER-LITE 2500 Watt Plant 110/120 v. 60 cyc. A.C. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lb. **\$329.50** Reg. price \$645.00. Factory Price (Item 21) **\$379.50**

3500 Watt Plant (Item 28) 115 v. 60 cyc. A.C. Push Button Start. Direct Drive. Wt. 270 lbs. **\$379.50** Factory Price

(Item 162) HI-LINE 6000 WATT PLANT Push Button Start, 115-230 v. 60 cycle A.C. A brute of a power plant with a rugged 14 hp. Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. Ideal where heavy current is needed. Wt. 590 lbs. Easily worth \$995.00. With self starter. Factory price **\$645.00** Same plant but with Crank Start. (Item 166) **\$585.00** Generator and control box only, belt driven. Use your own engine or tractor. Wt. 240 lbs. (Item 163) **\$345.00** Factory price.

HOBBY GRINDER CUTTING TOOLS and STONES

The first real improvement in drills for the wood working industry in over a century. This 3 in 1 drill bores a tapered hole which corresponds to the contour of a wood screw. This enables every thread on the screw to hold tight right down to the tip. (Ordinary drills bore straight holes which allow only part of the threads to come in contact with the wood.) Get increased holding power out of your screws; make better, longer-lasting joints. In addition you can countersink the hole. If desired, thus saving an extra operation. Merely send the drill home right down to the collar and you will get a perfectly countersunk hole without extra effort. Item 246. Set of 5 most commonly used sizes in handy kit; accommodates #7, 8, 10 and 12 screws. Wt. 2 lb. **\$3.75**

COMBINATION TAPER DRILL and COUNTERSINK The first real improvement in drills for the wood working industry in over a century. This 3 in 1 drill bores a tapered hole which corresponds to the contour of a wood screw. This enables every thread on the screw to hold tight right down to the tip. (Ordinary drills bore straight holes which allow only part of the threads to come in contact with the wood.) Get increased holding power out of your screws; make better, longer-lasting joints. In addition you can countersink the hole. If desired, thus saving an extra operation. Merely send the drill home right down to the collar and you will get a perfectly countersunk hole without extra effort. Item 246. Set of 5 most commonly used sizes in handy kit; accommodates #7, 8, 10 and 12 screws. Wt. 2 lb. **\$3.75**

1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator & engine. **\$199.50**

350 Watt Plant (Item 273) 115 v. D.C. 1 1/2 hp. Briggs Engine. Perfect for lights, radios, small power tools. Wt. 65 lbs. **\$99.75** Factory price.

(Item 31) MASTER-LITE 2500 Watt Plant 110/120 v. 60 cyc. A.C. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lb. **\$329.50** Reg. price \$645.00. Factory Price (Item 21) **\$379.50**

(Item 21) DIESEL LIGHT PLANT (Item 1660) Diesel Master 11-12 kw. 115/230 v. AC. Single or 3 phase. 1800 rpm. direct connected. Electric Self-starting. Engineered for permanent power where continuous low cost, heavy duty service is important. Wt. 1350 lbs. Reg. list **\$1895.00** Factory price. **\$1075.00**

10-11 kw. GAS DRIVEN PLANT. 115-230 v. 60 cyc. AC. Single or 3 phase, powered by 4 cylinder Wisconsin air cooled engine. Belt driven. Constructed similarly to Hi-Line 6 KW shown above but much larger. (Item 217) (with crank start) Wt. 900 lb. **\$1075.00** Same plant with elec. self-starter. **\$1145.00** We make fully automatic controls to operate any of the above light plants. Write for details.

WE MAKE ALL SIZES UP TO 25,000 WATTS

(Item 1660) 6 VOLT COMPRESSOR The ideal compressor for operating loud blast air horns on cars or boats, and for use as tire inflating equipment on service trucks or jeeps. Inflates tires in seconds. Compact! can be installed in small space under hood, in trunk, etc. High air output. (4 c.f.m.) Operates on standard 6 or 12 volt storage battery current. Built-in 1 1/2 H.P. electric motor. Solenoid switch. 6"x24" air tank. pressure gauge, safety valve, shut-off valve, automatic on and off switch. (Runs only when air is needed). Wt. 39 lbs. Item 355. Reg. **\$54.50** \$129.50. Our Special

Variable Speed Selector Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists — any operation requiring variable speed. Ideal for midge autos. Employs reliable "trouble free" planetary system. No hydraulic power losses or creeping. Infinite range, smooth operation, easy installation (data included). 3 sizes: 1 1/2-1 hp. wt. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs. Reg. list **\$228, \$252 and \$352.** Our prices **\$79.50, \$89.50 and \$114.50.**

MASTER SAFTI-FUSE

Flip-On fuses that restore electrical service by merely pressing a button. This amazing permanent circuit breaker protects all your electrical circuits against dangerous overloads (the cause of most fires). Just screw them in—in place of your old fuses and forget all fuse worries. Automatically interrupts any dangerously overloaded circuits. To restore service—just flip the button. Uncond. guaranteed SAFE. U.L. approved. Eliminate danger of shock from old-fashioned fuses and enjoy automatic permanent protection. Available in 15, 20 and 30 amp. sizes—please specify. Sent postpaid. 411 sizes. 4 for **\$5.25, \$1.35 ea.**

MASTER MECHANIC MFG. CO., DEPT. B E Burlington, Wis. Catalog

MASTER SNOW BLOW

SELF-PROPELLED It's a snow-blower It's a power sickle It's a cultivator

NO PUSHING Tractor shown with Snow Blow Attachment (Item 206)

It's a rotary tiller
It's a plow
It's a rotary mower

Where can you get a power tool that does so many jobs? Works for you the year 'round. Does terrific job of cleaning snow from walks, drives, etc. without backbreaking work. Also prepares deep mellow seed beds, cuts weeds, lawns, etc. The Master Gardener performs better—does more than tractors costing twice as much. Converts in minutes to Tiller, Power Sickle, etc. Basic, self-propelled 2 hp. tractor, Briggs **\$119.50** or Clinton engine. **\$139.50** Snow Blow **\$39.50** Cultivator **\$8.75** Rotary Tiller **\$42.50** Disc Harrow **\$15.75** Furrowing Tool **\$8.75** Plow **\$15.00** Rotary Lawn Mower **\$42.50** Sickle Bar Mower **\$42.50** Lawn Mower Hitch **\$4.50** Freight prepaid to most areas. Easy payment plan available.

EXTENSION CORD

(Item 16) Heavy duty, made of Buna rubber insulated #14-2 conductor, stranded wire encased in a treated braid jacket. So tough that you can drive over it. Use indoors or out. Resists oil, grease or water. Extends electricity up to 400 ft. without voltage drop. Complete with heavy rubber plug and outlet. (Item 16) 40 ft. (wt. 21 1/2 lbs.) Usually **\$1.99 84.50. Special **\$4.50** Combination 2—40 ft. & 1—20 ft. (total 100 ft.) (Item 16c) **\$4.95** 100 ft. length (1 piece) (Item 16p) **\$4.85****

NEOPRENE CABLE #14-2 (Item 185) Heavy duty, very flexible. 20 year quality. Wt. 9 lbs. 100 ft. Complete with rubber plug and outlet. A terrific buy at only **\$8.95**

NO. 12-2 POWER CABLE. Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 199) wt. 8 lbs. **\$6.95** 100 ft. (Item 200) **\$12.95**

Variable Speed Selector

Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists — any operation requiring variable speed. Ideal for midge autos. Employs reliable "trouble free" planetary system. No hydraulic power losses or creeping. Infinite range, smooth operation, easy installation (data included). 3 sizes: 1 1/2-1 hp. wt. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs. Reg. list **\$228, \$252 and \$352.** Our prices **\$79.50, \$89.50 and \$114.50.**

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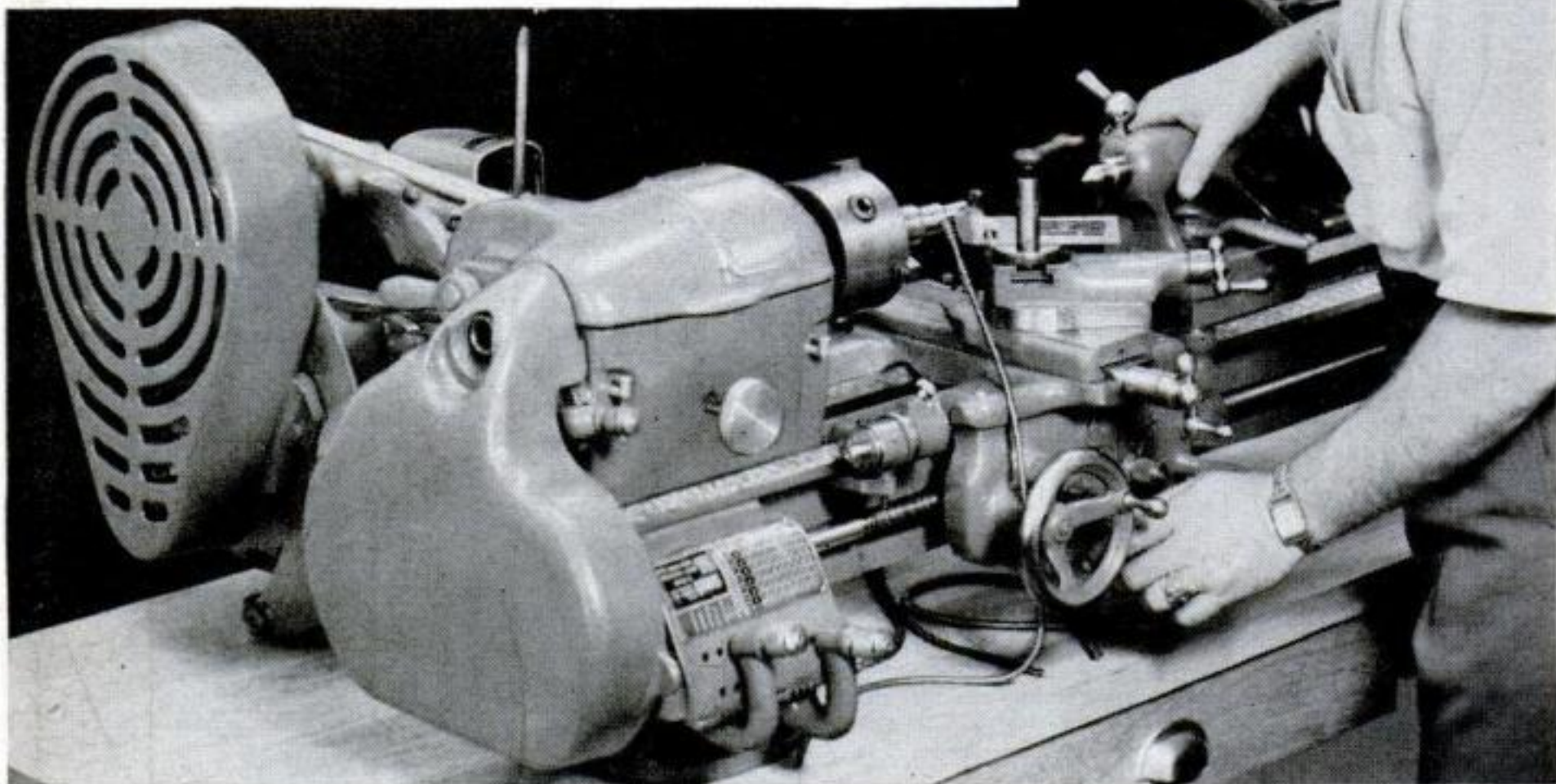
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About 200 Television stations are now on the air from coast-to-coast. Hundreds more being built and hundreds of others authorized. These new stations will need operators, technicians. More than 25 million Television sets are already in use and require servicing. Thousands more Television sets are being sold every week and need installation, servicing. Act now to qualify for a good job or your own sales and service business. Cash in on this rapid growth.

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